USATHAMA

U.S. Army Toxic and Hazardous Materials Agency

JEFFERSON PROVING GROUND

SITE-SPECIFIC SAMPLING DESIGN PLAN

Prepared For:

U. S. ARMY TOXIC AND
HAZARDOUS MATERIALS AGENCY (USATHAMA)
ABERDEEN PROVING GROUND, MARYLAND

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Prepared By:

CHEM-NUCLEAR ENVIRONMENTAL SERVICES, INC.
GRAND JUNCTION, COLORADO

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1.0 INTRODUCTION

The purpose of this document is to outline field sampling and laboratory analyses that are to be conducted as part of the Jefferson Proving Ground Site-Specific Sampling and Analysis (SSSA) program. Jefferson Proving Ground (JPG) is a U.S. Army facility located in Madison, Indiana. The SSSA at JPG is being conducted in support of the U.S. Army Toxic and Hazardous Materials Agency (USATHAMA) under contract No. DAAA15-90-0007, Task Order 0002.

The general objective of this work is to aid ongoing efforts to maintain and protect human health and environmental quality. The work described in this Sampling Design Plan will accomplish this objective through the collection of water and sediment samples from three specific "areas." These samples will then be analyzed to determine if past activities at Jefferson Proving Ground (JPG) have caused contaminants to enter the groundwater, stream water or stream sediments of JPG. Although JPG is not on the National Priorities List (NPL) and is, therefore, not strictly required to adhere to requirements of the Comprehensive Environmental Response, Compensation and Liability Act (CERCLA), work conducted during the SSSA will be performed according to standard CERCLA protocols. All work conducted during the SSSA will also conform to all appropriate USATHAMA requirements.

The results of this work will be used to determine if contaminants originating on the JPG installation have:

(1) entered the groundwater beneath the Gate 19 Landfill or the Depleted Uranium (DU) Impact Area,
(2) entered surface waters and sediments that exit the site via surface streams and creeks, or
(3) entered surface waters and sediments in the beds of streams that drain the site.

This Sampling Design Plan is the second volume in a four-part series of documents that govern the work to be performed during the SSSA. The other documents include:

- Site Specific Technical Plan (SSTP)
- RI/FS Quality Control Plan (Volume III)
- RI/FS Health and Safety Plan (Volume IV)

Because the field and laboratory work to be conducted during the SSSA is virtually identical in nature to that which will be done during the RI/FS, the Quality Control and Health and Safety Plans prepared for the RI/FS will serve as Volumes III and IV of the SSSA planning documents.

1.1 Sampling Design Plan Organization

This plan, entitled Jefferson Proving Ground Site Specific Technical Plan, describes in detail the field sampling, data collection, and laboratory analysis activities that are to be conducted during the SSSA. Overall project background and objectives, quality control issues and health and safety concerns are addressed in the accompanying documents (SSTP, Volume III, and Volume IV, respectively). This Sampling Design Plan is organized as follows:

Section 1.0 Introduction
Section 2.0 Site Background and Environmental Setting
Section 3.0 Sampling Objectives
Section 4.0 Description of Field Procedures
Section 5.0 Sample Handling Procedures and Protocols
Section 6.0 Quality Control
Section 7.0 Health and Safety
Section 8.0 References

1.2 Scope of Work

The scope of work for the SSSA at JPG is limited to:

(1) sampling, analysis, and water-level measurement of groundwater in 15 monitoring wells at the Gate 19 Landfill;
(2) sampling, analysis, and water-level measurement of groundwater in 9 monitoring wells in the DU Impact Area; and
(3) sampling and analysis of water and sediment at 9 stream-entrance points and 18 stream-exit points on the JPG facility boundary. JPG is not a designated Superfund site and the SSSA is not formally included in the planned Remedial Investigation/ Feasibility Study (RI/FS). As noted previously, however, all sampling and analysis conducted during the SSSA will be done in accordance with standard Superfund/CERCLA and USATHAMA protocols.

2.0 SITE BACKGROUND AND ENVIRONMENTAL SETTING

2.1 Location

JPG occupies 55,265 acres of land along U.S. Highway 421 north of Madison, Indiana (see Figure 1). The facility is located in portions of three counties (Ripley, Jennings, and Jefferson Counties). The installation is approximately 18 miles long (north-south) and 5 miles wide (east-west). The major portion of JPG is wooded. Industrial buildings and workshops as well as administrative buildings and personnel housing are located in the southern portion of the facility. A line of 268 gun positions runs east-west across the southern portion of JPG. Weapons are fired at targets located to the north of these gun

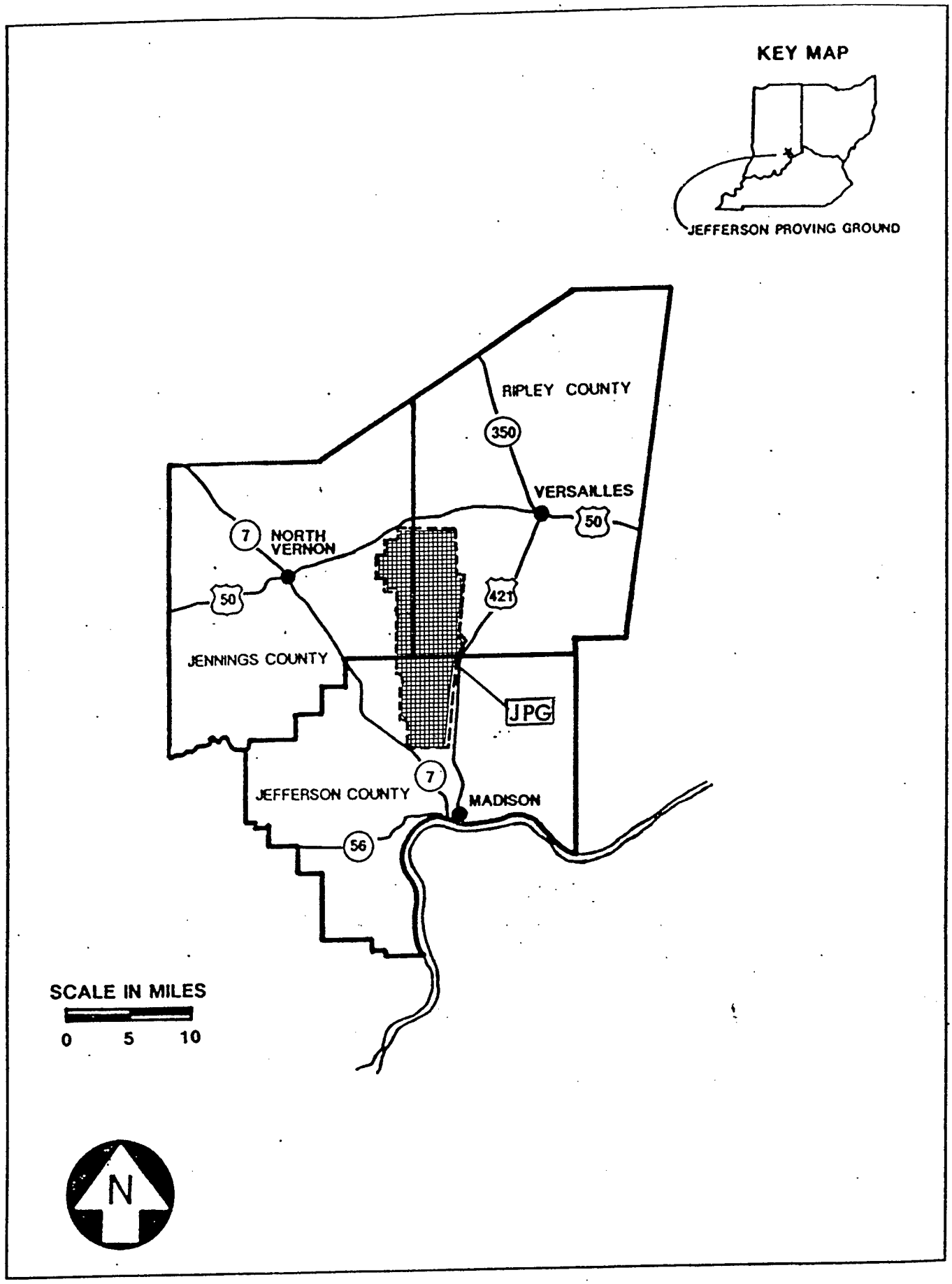

Figure 1. Map showing location of Jefferson Proving Ground.

positions. This line of gun positions is referred to as the Firing Line. The Gate 19 Landfill and the DU Impact Area are located north of the firing line. Stream sampling locations are both north and south of the firing line.

2.2 Site History

JPG has been used as a testing proving ground since May 1941. A wide assortment of conventional munitions and weapons have been tested at the facility. These include propellants, projectiles, cartridges, mortars, grenades, fuses, primers, boosters, rockets, tank ammunition, mines and weapon components. The mission of JPG has been to plan and conduct production acceptance tests, reconditioning tests, surveillance tests, and other studies of ammunition and weapons systems.

Past and present activities at JPG have resulted in the detonation, burning and disposal of many types of waste propellants, explosives and pyrotechnic substances at the site. These activities have resulted in several physically and chemically hazardous wastes throughout the facility. Physical hazards mainly involve unexploded ordnance (UXO). Chemically hazardous wastes include various explosive compounds, waste propellants, lead, chlorinated solvents, wood preservatives, sulfur, silver, photographic development wastes, sanitary wastes, and petroleum products. Some of these wastes are known to have been released into the soil. As a result, the groundwater and surface water pathways may have also been contaminated. Previous environmental investigations have been limited in scope and have not adequately characterized the nature and extent of contamination at JPG.

Impact areas at JPG include high impact targets, asphalt and sediment bottom ponds for testing proximity fuses, a gunnery range, mine fields, and a depleted uranium impact area. Surrounding the impact areas are safety fans where wide, long, or short rounds may fall. These areas are all considered to be contaminated with explosive ordnance. The impact areas are kept clear of vegetation by herbicides application.

The Defense Secretary's Commission on Base Realignment and Closure recommended JPG among other bases for closure and/or realignment in December 1988. The Congress mandated JPG be closed and its mission be realigned with Yuma Proving Ground in April 1989. As a result, USATHAMA was given the responsibility for managing and conducting environmental investigations at JPG in association with the Base Closure Program. Under the base closure plan, testing activities are expected to stop in 1994 and land disposition is expected to be accomplished by 1995 (Ebasco, 1990).

2.3 Previous Investigations

Section 8.0 of this plan provides a list of References to previous investigations conducted at JPG. Several reports regarding various environmental aspects of JPG have been written over the years. Many were site-specific while others were facility-wide investigations. The facility-wide investigations included an Environmental Impact Assessment of JPG (O'Neill,

1978), an Installation Assessment of JPG (USATHAMA, 1980), an Update of the Initial Assessment (Environmental Science and Engineering, 1988), a Report to the Governor (Indiana Department of Environmental Management, 1989) and an Environmental Audit of JPG (EPA, 1990). Another significant report dealing with environmental practices at JPG was a RCRA Part B Permit Application for Open Burning/Open Detonation (U.S. Army Corps of Engineers, 1988).

In January 1989, Environmental Science and Engineering (1989) completed a limited remedial investigation of the Gate 19 Landfill and Buildings 279, 602, and 617. It was during this investigation that 12 of the 15 monitoring wells at the Gate 19 Landfill were installed.

In October 1989, Ebasco Environmental (Ebasco, 1990a) began an enhanced Preliminary Assessment (PA) through Argonne National Laboratory to support the Base Realignment and Closure Program. This PA was based on a review of the above described existing information which included JPG records, reports, and aerial photographs. The enhanced PA, through review and analysis of previous data, identified and characterized areas requiring further environmental evaluation (AREEs), defined potential pathways for contaminant migration, identified potential receptors of contamination, and provided recommendations for further study.

A follow-up report to the enhanced PA was prepared by Ebasco (1990b) in November 1990. This report, Master Environmental Plan (MEP), was designed to support the Base Closure process by providing additional information required to characterize areas of concern at JPG, supporting the Installation Restoration Program (IRP) activities, providing information to be used to prioritize site actions, and assisting in the development of cost-effective response actions. The MEP described, in detail, the existing conditions at 46 SWMUs and AREEs at JPG, additional data required, and proposed activities to provide the required data.

Monitoring wells were installed at the DU Impact Area as part of the requirements of the radioactive materials license issued by the Nuclear Regulatory Commission. These wells have been sampled an analyzed for uranium contamination on a regular basis. No evidence of uranium contamination in the groundwater beneath the DU Impact area has been found to date.

2.4 Environmental Setting

2.4.1 *Physiography*

JPG is located in the Till Plains section of the Central Lowlands Physiographic Province which is characterized by young till plains with no pronounced moraine features. Topography of JPG is flat to rolling, with most relief due to stream incision. Seven streams and their tributaries drain the JPG area.

2.4.2 *Climate*

The climate at JPG is mid-continental with frequent changes in temperature and humidity. During the summer, the temperature averages from the mid 70s and mid 80s (°F) and on an average, the temperature exceeds 90°F for 39 days a year. Winter temperatures generally range from 22-35°F. The total annual precipitation is approximately 42-44 inches with nearly 50 percent of the precipitation occurring during the growing season. On the average, 28 days of the year have precipitation greater than or equal to 0.5 inch. The region of JPG is subject to tornadoes and severe thunderstorms. Tornadoes in 1974 reportedly caused 9 deaths and many injuries in the communities of Madison and Hanover. No damage was reported for JPG from these storms.

2.4.3 *Geology*

Jefferson Proving Ground lies on the western limb of a plunging anticline known as the Cincinnati Arch. The geology is characterized by glacial tills that overlie Ordovician and Silurian limestones and dolomites interbedded with shales.

Surficial deposits consist of glacially-derived soils over glacial till of Illinoisan and Wisconsinan Age and is characterized by silts and clays with only minor amounts of gravel and rock fragments. The 2 major soil associations present at JPG are the Cincinnati-Rossmoyne-Hickory and the Avonburg-Clermont. The Cincinnati-Rossymoyne-Hickory soils are generally deep and moderately well to well drained, whereas, the Clermont-Avonburg soils are poorly drained. The Cincinnati-Rossmoyne-Hickory soils are composed of silty, clayey loam, loess and underlying glacial till. This association is found mainly along stream drainages at JPG. The Clermont-Avonburg soils are also composed of silty, clayey loam and are found mainly on broad ridges. Both associations contain fragipan layers (low permeability, firm, and brittle) which restrict the downward movement of water. The underlying unconsolidated glacial tills are typically 25 to 30 feet thick, but are generally absent in the stream valleys at JPG.

Bedrock at JPG consists of thick sequences of interbedded limestones, dolomites, and shales or Ordovician and Silurian ages. Outcrops of thinly bedded limestones and shales see in stream drainages at JPG are from the Dillsboro Formation. The Dillsboro Formation is composed of gray calcareous shale with thin limestone interbeds (up to 50%). The sequence contains joints and fractures.

2.4.4 *Hydrology*

Water table depths within JPG are relatively shallow, generally less than 20 feet. The water table varies according to the season. There are several flat areas where the water is at the surface and remains for extended periods. The apparent direction of groundwater flow is to the west-southwest which coincides with the direction of surface drainage and regional dip of the bedrock.

Although little hydrologic information is available for JPG, outcrops of the limestone bedrock show vertical joints and fractures in addition to abundant bedding planes. These features may contribute to some downward migration of water from the shallow unconfined aquifer.

Surface water at JPG consists of several major drainages which generally flow in a northeast to southwest direction across JPG toward the Ohio River (Figure 2) and also consists of at least 10 ponds/lakes (most of which are stocked with fish and used for recreational purposes).

The southern portion of JPG is drained by Harberts Creek which leaves the installation at the southwest corner. Middle Fork Creek and its tributaries drain the south central portion of JPG.

Big Creek traverses JPG north of Middle Fork Creek and has tributaries originating both on and off the installation. To the north and west of Big Creek is Marble Creek which originates on JPG.

Little Graham Creek originates off the installation and traverses the north central portion of the installation along with its major tributaries, Horse and Poplar Branch. Big Graham Creek also originates off the installation, traversing JPG nearly parallel to and north of Little Graham Creek. The two major tributaries of Big Graham Creek are Grapevine Branch and Rush Branch which originate on the installation.

Little Otter Creek, Otter Creek and its tributaries, Falling Timber Branch and Vernon Fork, join in the northwestern corner of JPG before exiting the installation at the western boundary.

2.5 Land Use/Demography

JPG is surrounded by several small rural towns including New Marian, Holton, Nebraska, Rexville, Grantsburg, Belleview, Middlefork, San Jacinto, and Wirt. The area immediately adjacent to the installation is farm land consisting primarily of crops of sorghum, tobacco, corn, and wheat.

Most of JPG is wooded with the exception of impact areas and clear areas surrounding building complexes. As a result, the installation has an active forest and wildlife management program. Limited hunting and limited timber sales are a part of this management program.

Employment at JPG ranged from 1,774 in 1953 to 386 which was reported in 1990.

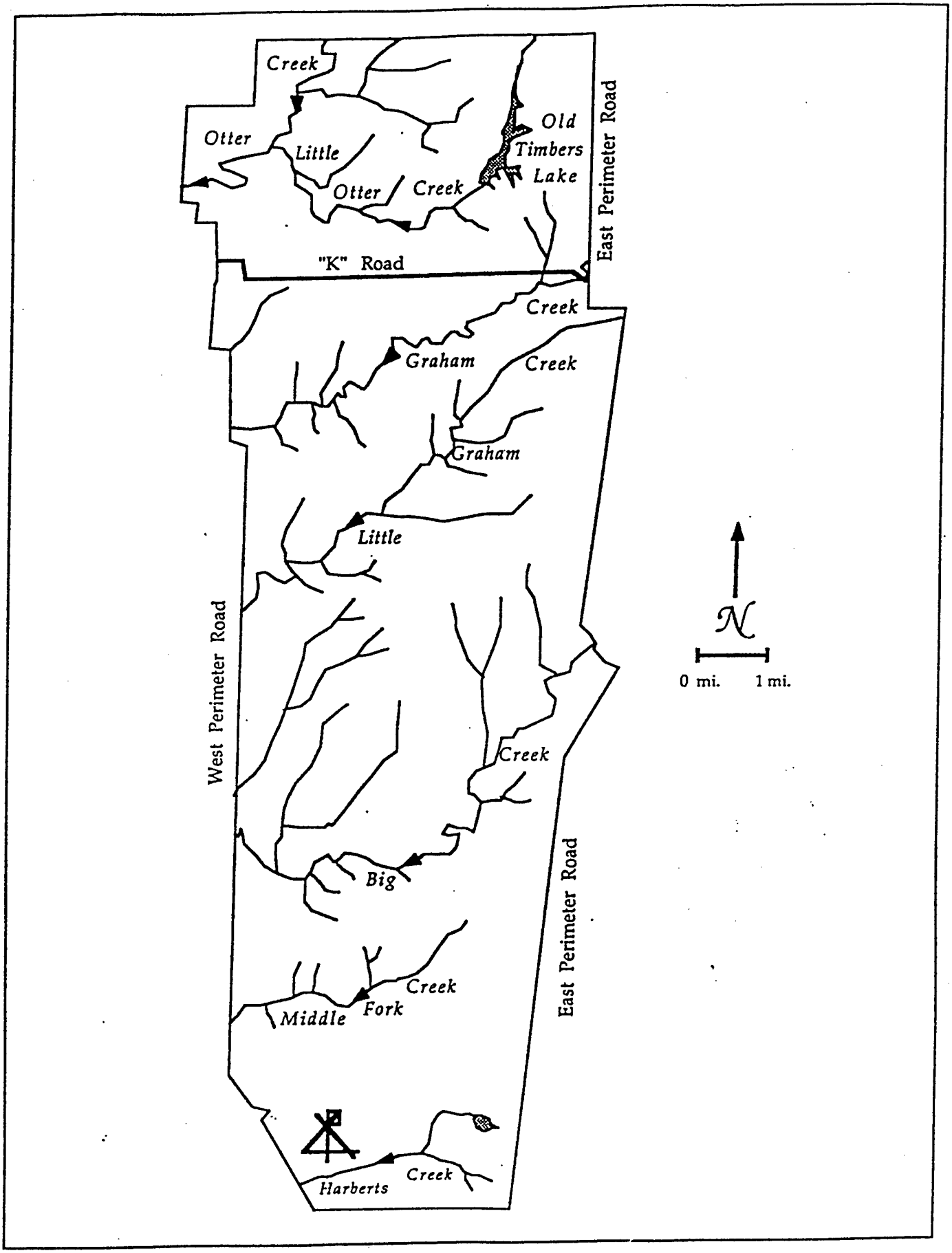

Figure 2. Schematic illustration of surface water drainage system at JPG.

3.0 SAMPLING OBJECTIVES

3.1 Introduction

The overall objective of the SSSA is to protect public health and environmental quality by determining if past or current practices at JPG have contributed contaminants to groundwater at the Gate 19 Landfill or the DU Impact Area or to surface water and sediments in creeks that drain the JPG site. Quantification of contaminant concentrations for specific lists of compounds will allow recommendations to be made for subsequent activities necessary to maintain protection of public health and the environment.

3.2 Data Quality Objectives

Because the work to performed during the SSSA will be done according to CERCLA as well as USATHAMA protocols, data quality objectives (DQOs) and levels will be specified for each of the data collection activities. DQOs provide a mechanism of categorizing data according to the level of analytical support needed to satisfy planned data use objectives (EPA, 1987). A brief summary the five data quality levels is provided here:

- Level I—field screening or analysis using portable instruments. Results are often not compound-specific and not quantitative. This is the most inexpensive analytical optionand is capable of providing "real-time" data (i.e., no turn-around time).
- Level II—field analyses using more sophisticated portable analytical instruments: in some cases, the instruments may be set up in a mobile laboratory on site. There is a wide range in the quality of the data that can be generated. It depends on the use of suitable calibration standards, reference materials, and sample preparation equipment. Results become available within minutes to several hours.
- Level III—all analyses performed in an off-site analytical laboratory. Level III analyses may or may not use CLP procedures. Validation and documentation procedures required for CLP Level IV analysis are not commonly required for Level III analysis. The analytical laboratory may or may not be a certified CLP laboratory.
- Level IV—CLP routine analytical services. All analyses are performed in an off-site CLP analytical laboratory following CLP protocols. Level IV is characterized by rigorous QA/QC protocols and documentation.
- Level V—analysis by non-standard methods. All analyses are performed in an off-site laboratory which may or may not be a CLP laboratory. Method development or method modification may be required for specific constituents or detection limits.

For all chemical analysis of water and sediment samples, the data quality objective will be contaminant detection and concentration quantification. For the SSSA, all laboratory analysis to determine concentrations of "exotic" explosive compounds will be classified as Data Quality Level V, since the analytical methods to be used are those required and approved by USATHAMA. Laboratory analysis for more conventional compounds, such as Target Compound List (TCL) metals, will carry a data quality level of III and will be based on

CLP-approved and USATHAMA-approved analytical procedures. The data quality objective for groundwater-elevation measurements will be to establish approximate groundwater flow directions and velocities. The data quality level will be Level II.

3.3 Sampling Rationale and Design

This section describes the rationale for each of the three data collection activities to be conducted during the SSSA. A detailed description of the data to be collected (e.g., analyte lists) is also provided.

3.3.1 *Stream Water and Stream Sediment Sampling and Analysis*

It is possible that contaminants from impact areas, waste disposal areas, and hazardous-materials-use areas on JPG could be transported (via overland flow and groundwater discharge) to surface streams and sediments. Because the surface streams that drain JPG would provide a mechanism by which potential contaminants could rapidly migrate off the facility, and these streams have never been tested for contamination in the past, sampling and analysis of stream water and stream sediment will be conducted during the SSSA. This sampling and analysis was recommended in the 1990 EPA environmental audit (EPA, 1990). Samples will be collected from entrance and exit points of streams that drain JPG. The objective of the sampling and analysis is to determine if JPG is contributing contaminants to the surface streams or sediments.

Four major streams and their tributaries enter JPG at 8 different locations. These streams include Otter Creek, Graham Creek, Little Graham Creek, and Big Creek. At 18 different locations, a total of 7 streams and their tributaries exit the JPG boundary. These streams include Otter Creek, Graham Creek, Little Graham Creek, Marble Creek, Big Creek, Middle Fork Creek, and Harbert Creek. Drainage is generally from the northeast to the southwest. Water and sediment samples will be collected from the 9 main entrance points and the 18 main exit points. At both entrance and exit points, samples will be collected from just inside the JPG property boundary so as to prevent property access problems involving private landowners. An index to locations of entrance and exit sample points is shown in Figure 3. Detailed maps of individual sampling locations are presented in Figures 4 through 13.

Samples from entrance points will be analyzed for 6 herbicides and total uranium. Samples from exit points will be analyzed for herbicides, explosive compounds and Target Compound List (TCL) metals (water sample analysis will include both dissolved and total metals analyses). Analysis of samples from the five exit locations that receive drainage from the DU Impact area (exit points 3, 5, 6, 7, and 8) will include total uranium. All QA/QC stream samples will be analyzed for the complete set of herbicides, explosive compounds, metals and total uranium. Table 1 summarizes the analytes for water and sediment samples from stream entrance and exit points.

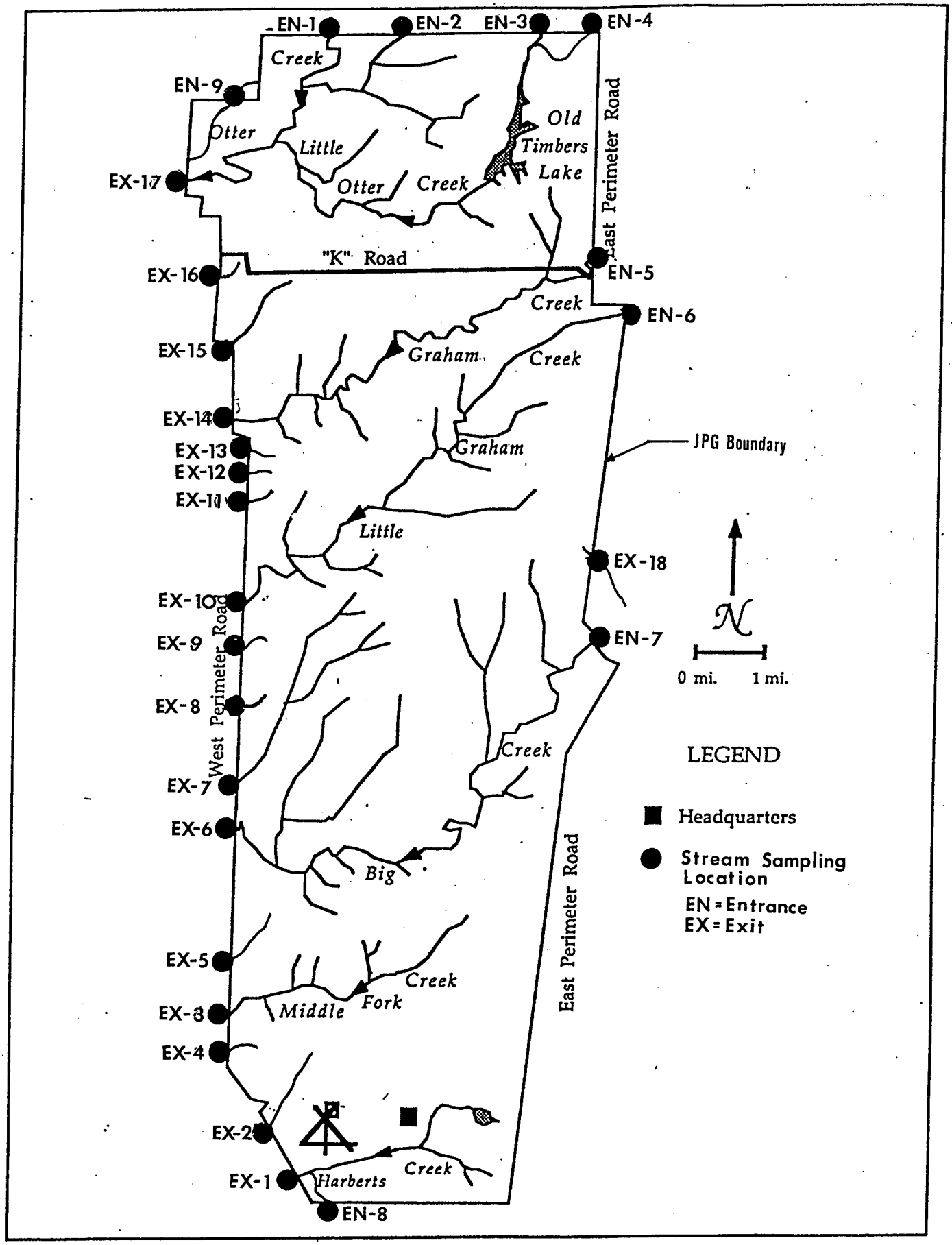

Figure 3. Stream Sampling Location Index Map

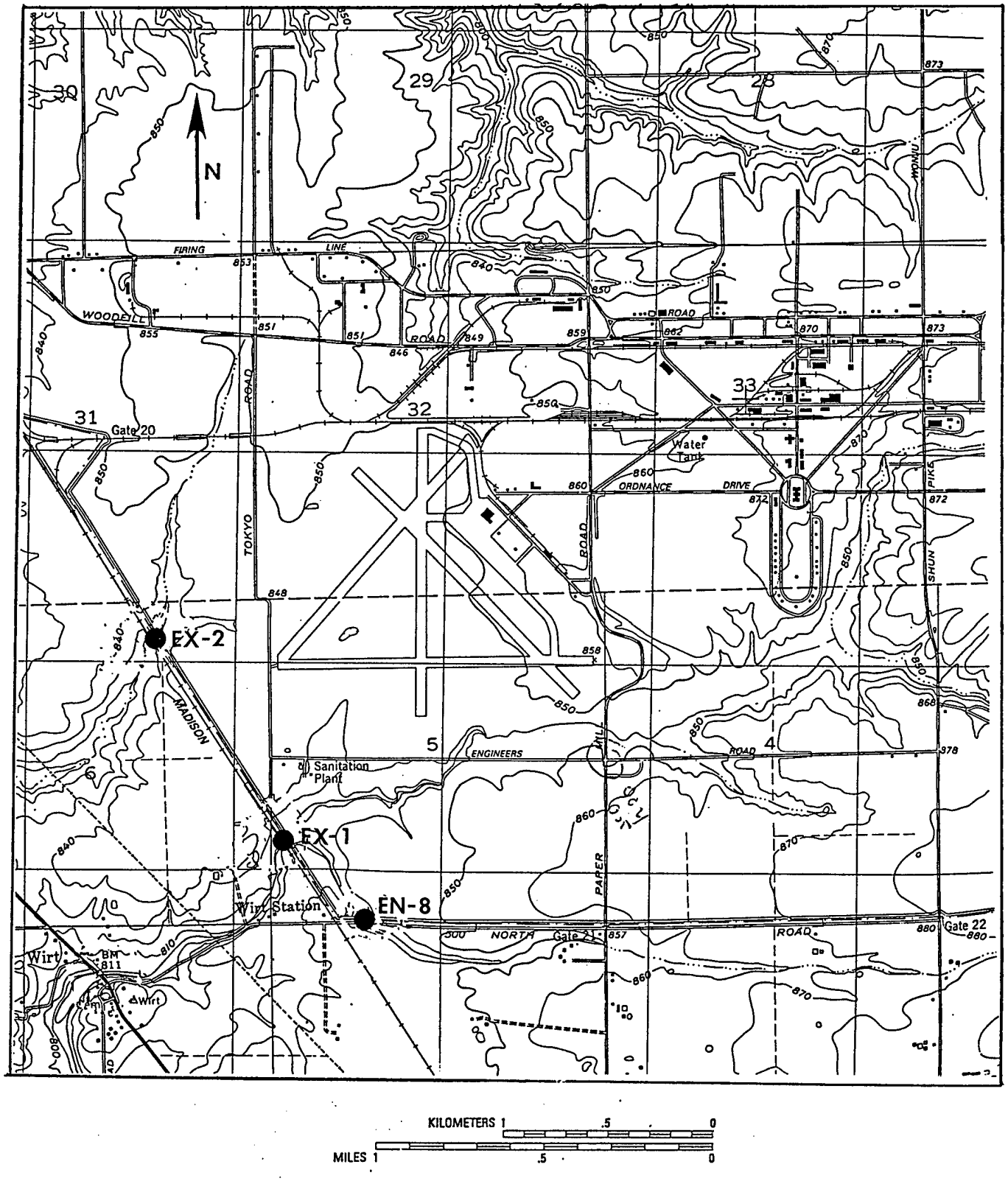

Figure 4. Stream Exit Sample Locations 1 and 2 and Stream Entrance Sample Location 8

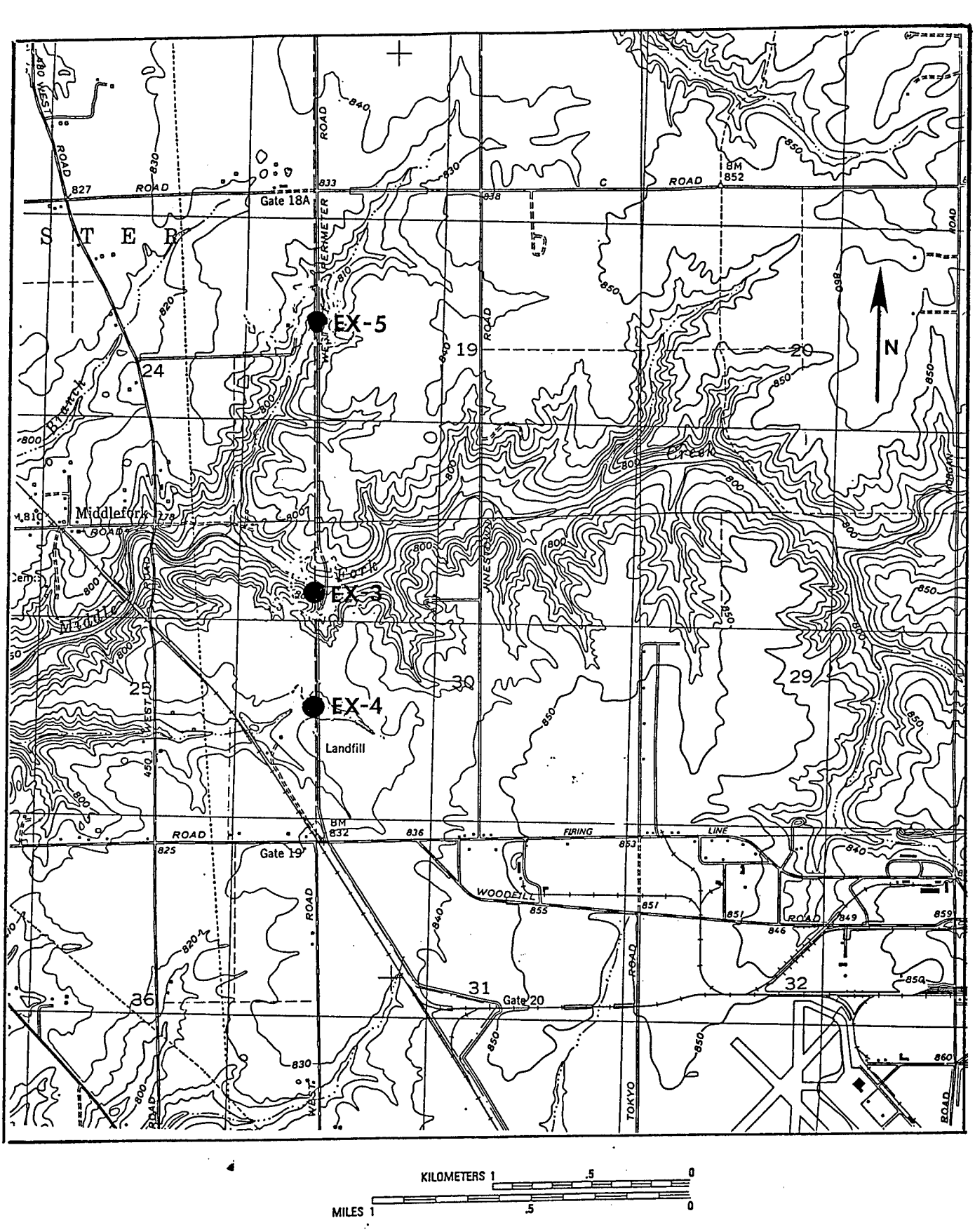

Figure 5. Stream Exit Sample Locations 3, 4, and 5

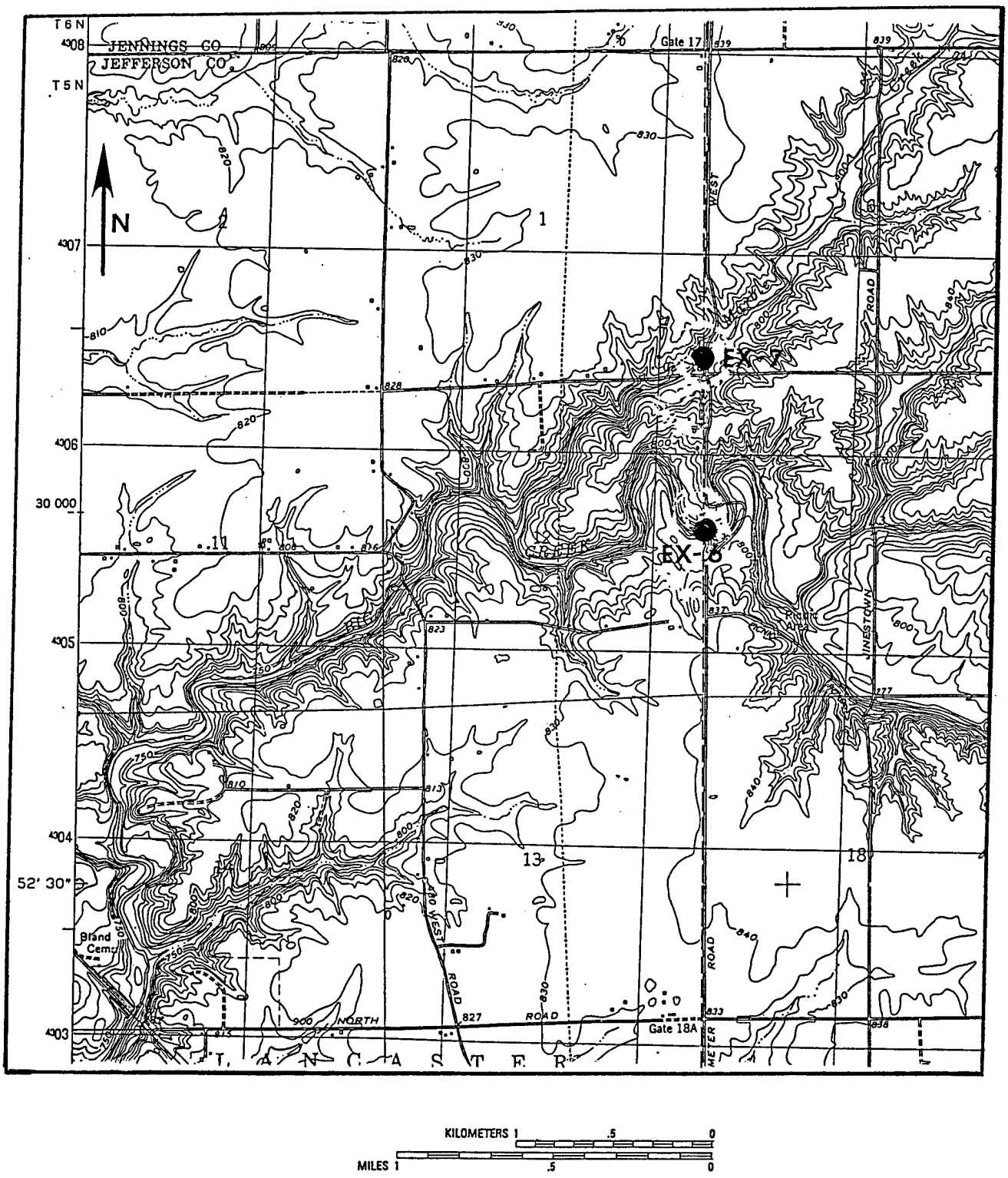

Figure 6. Stream Exit Sample Locations 6 and 7

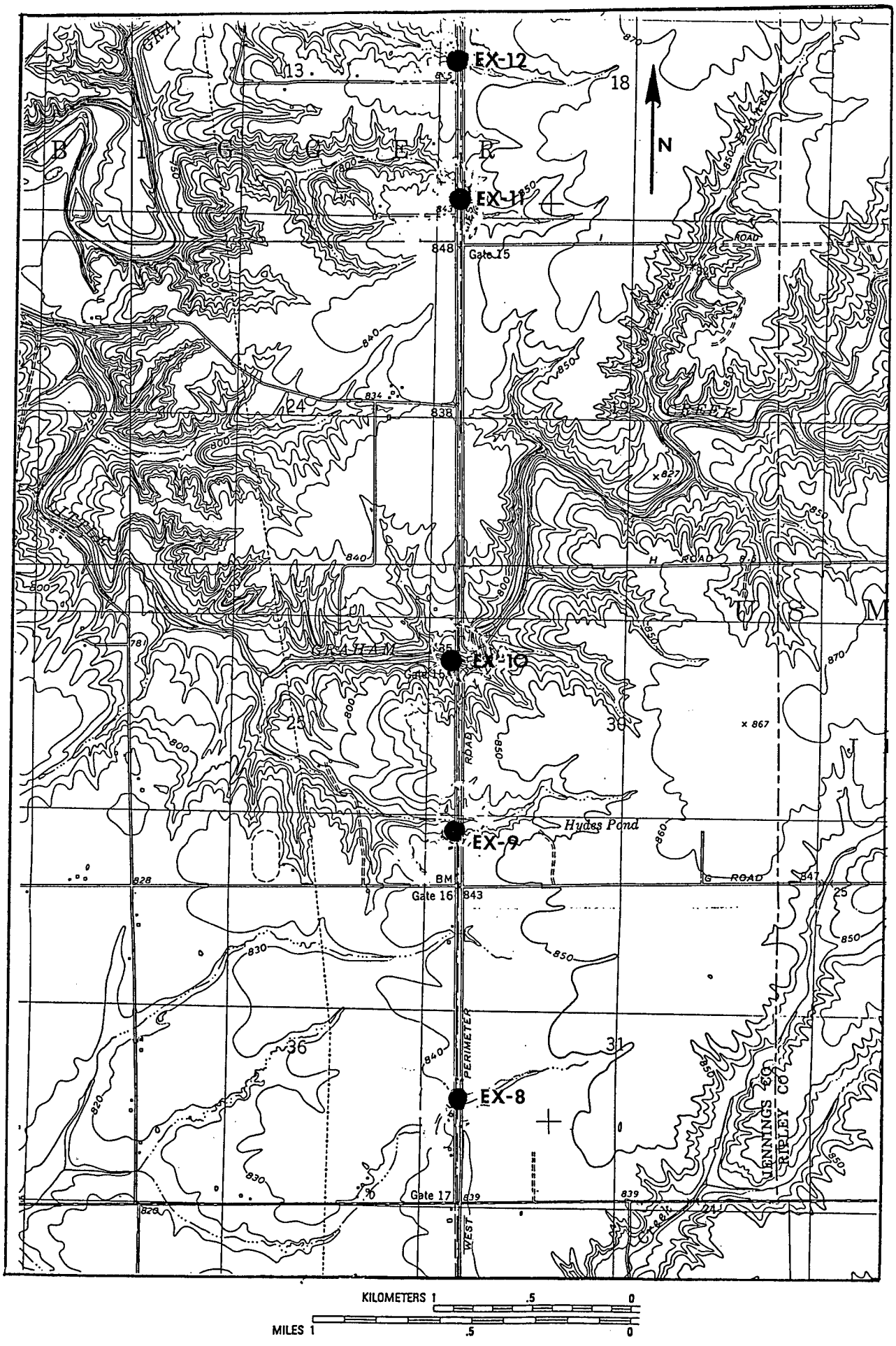

Figure 7. Stream Exit Sample Locations 8, 9, 10, 11, and 12

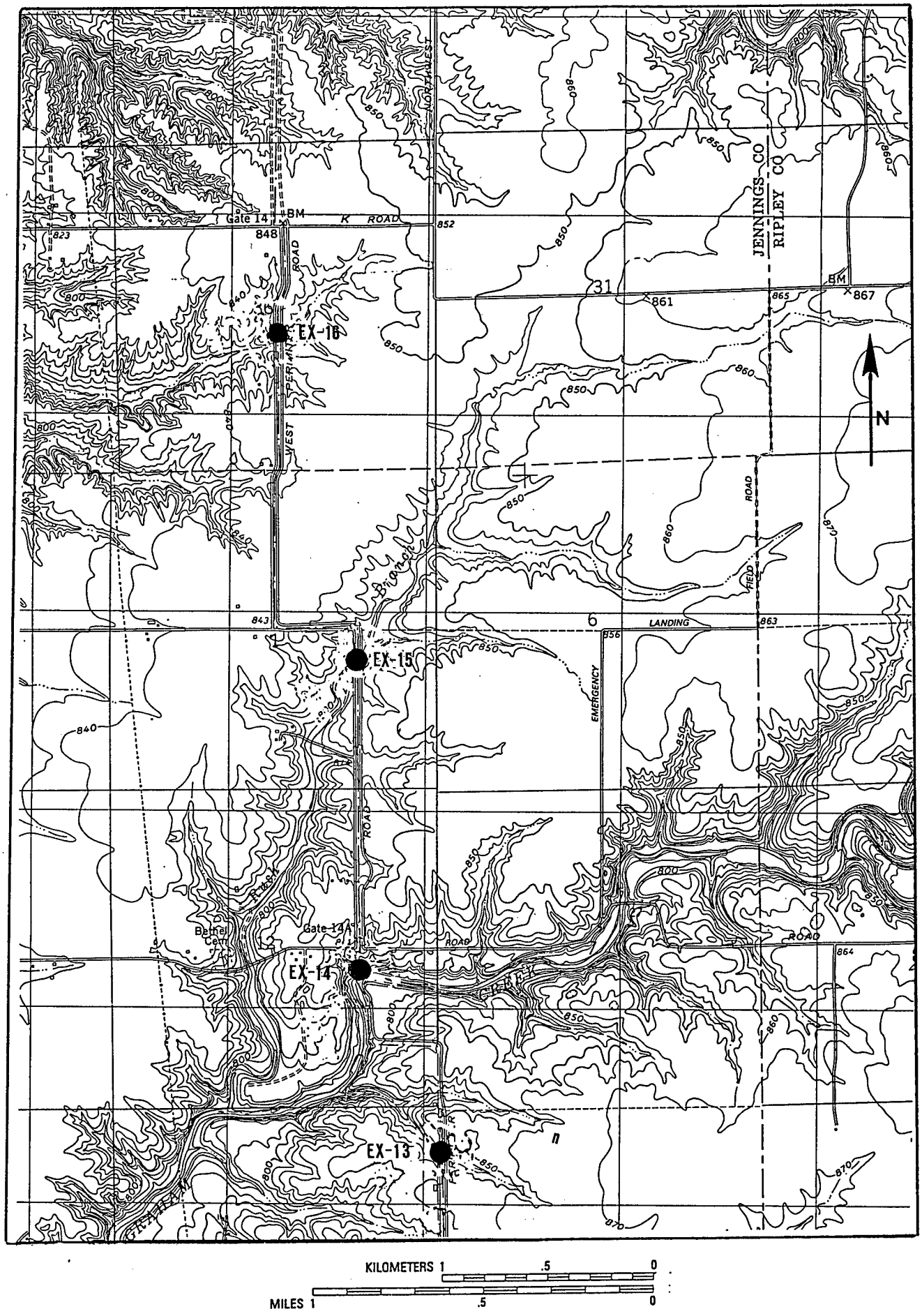

Figure 8. Stream Exit Sample Locations 13, 14, 15, and 16

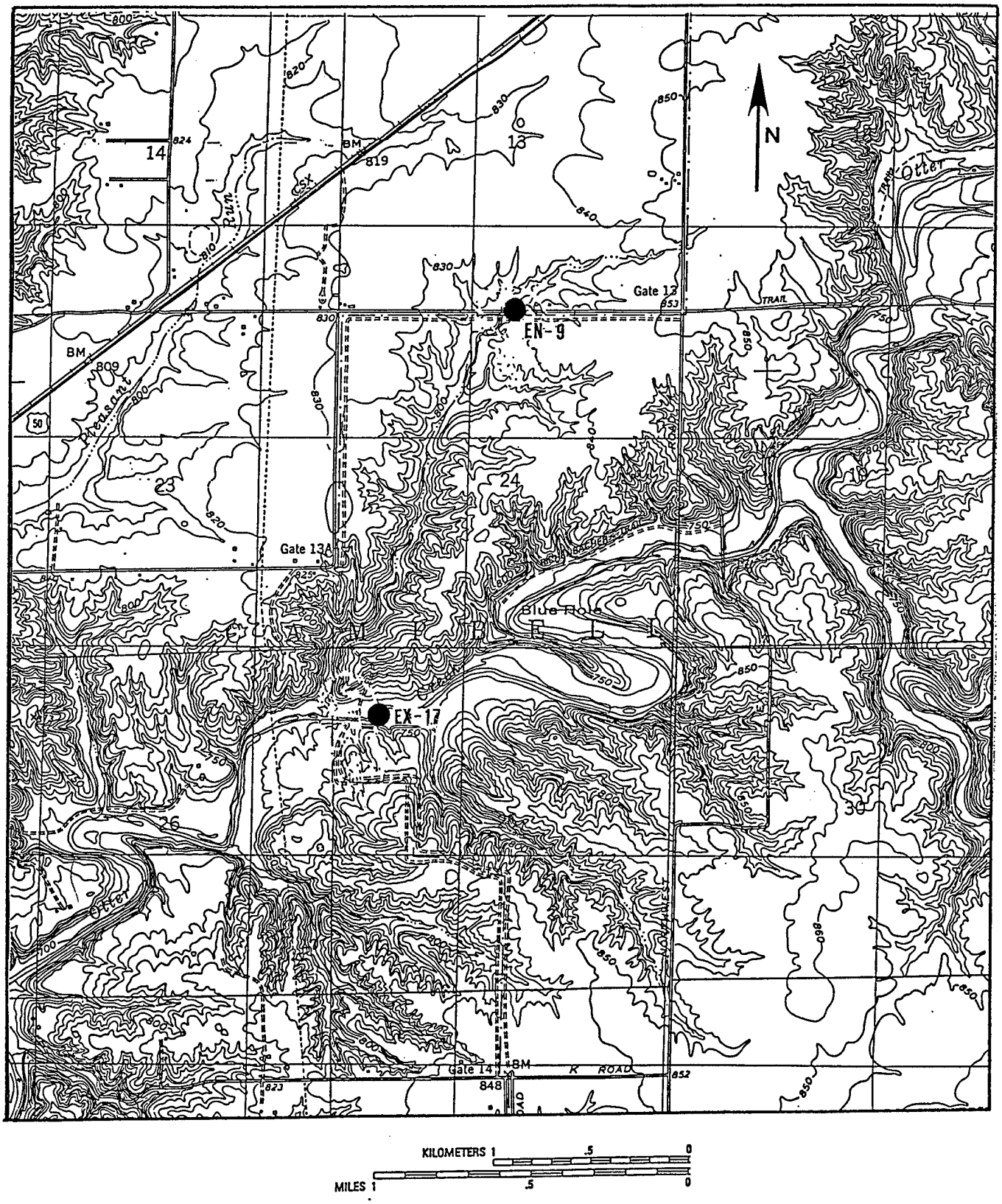

Figure 9. Stream Exit Sample Location 17 and Stream Entrance Sample Location 9

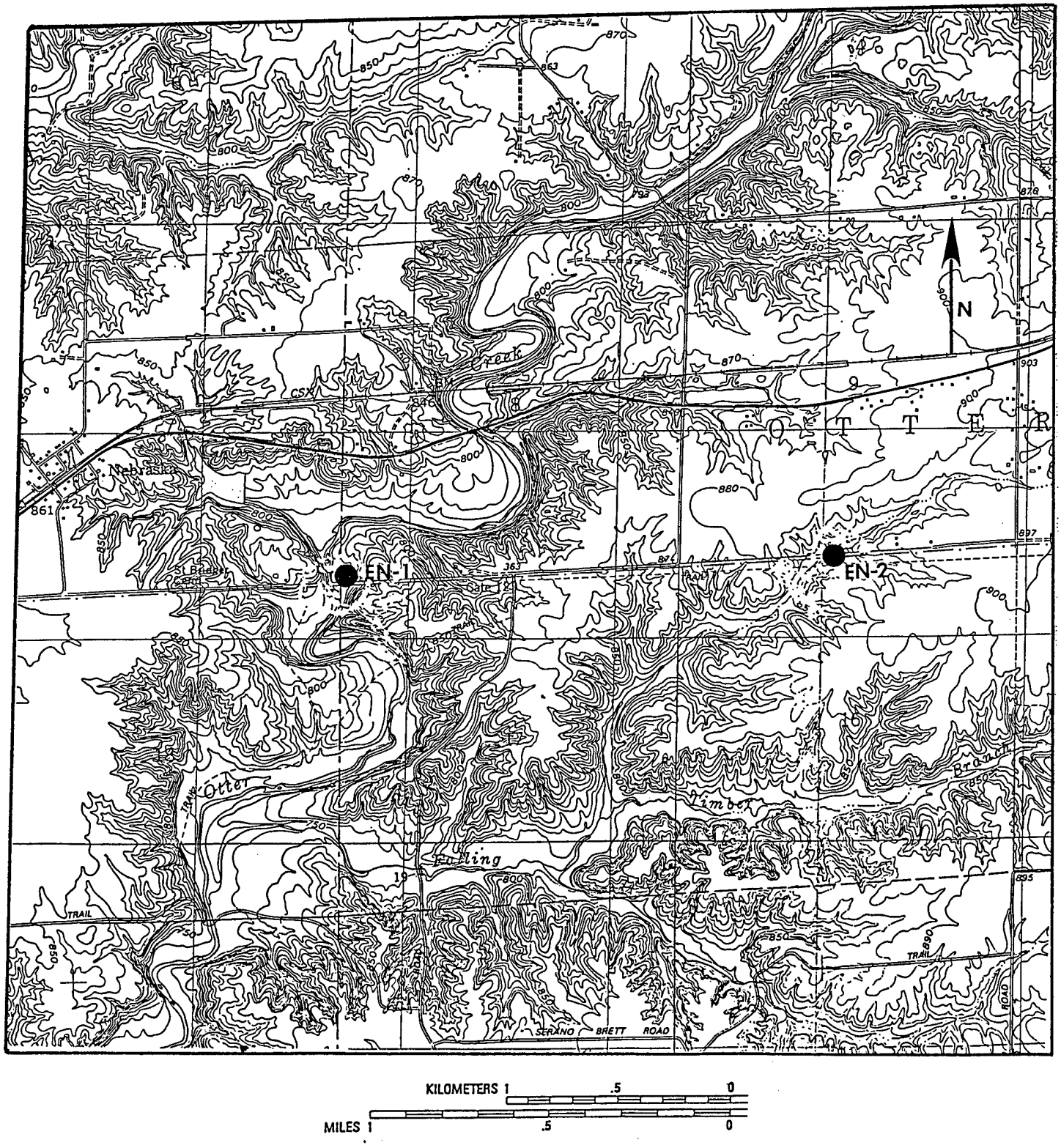

Figure 10. Stream Entrance Sample Locations 1 and 2

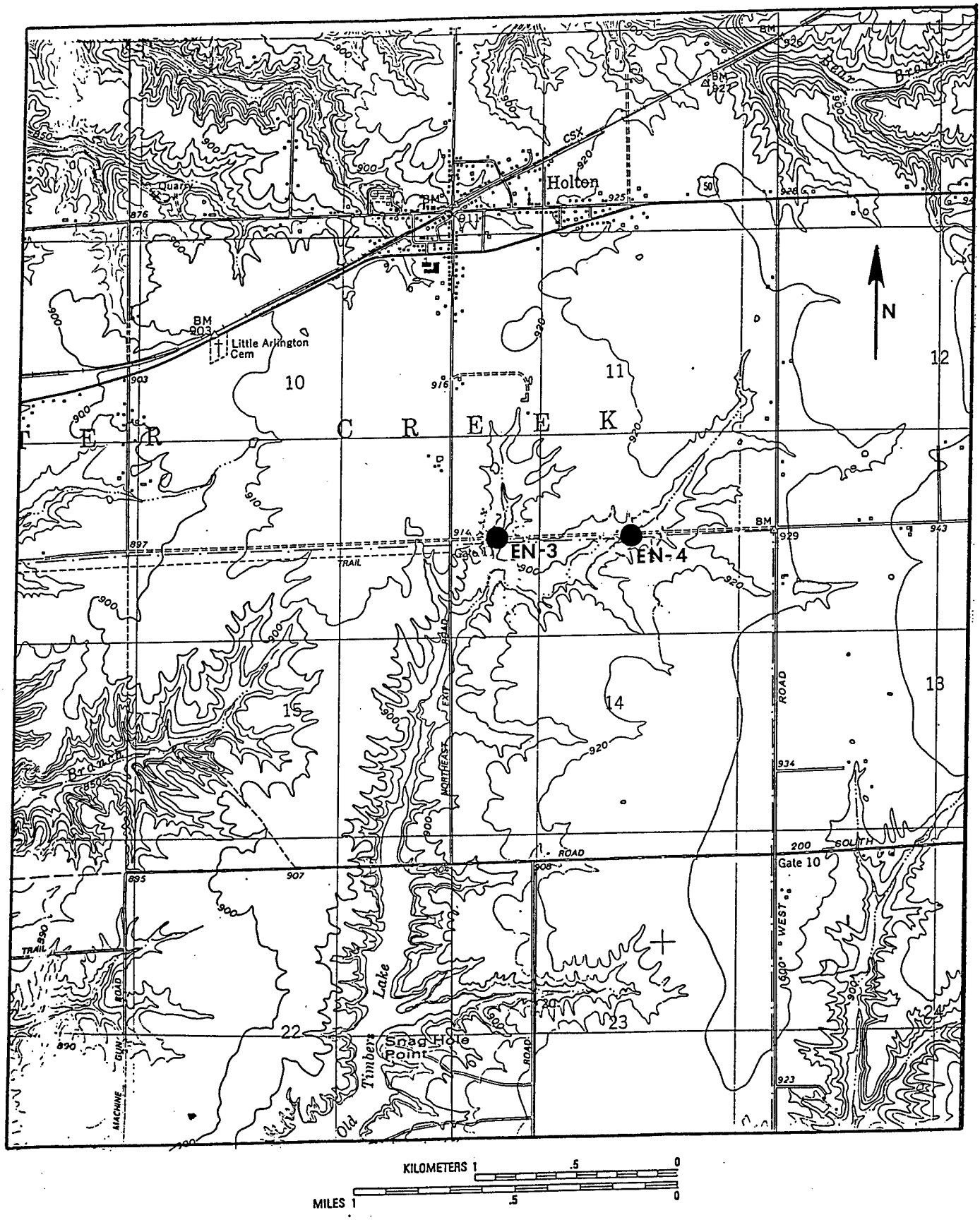

Figure 11. Stream Entrance Sample Locations 3 and 4

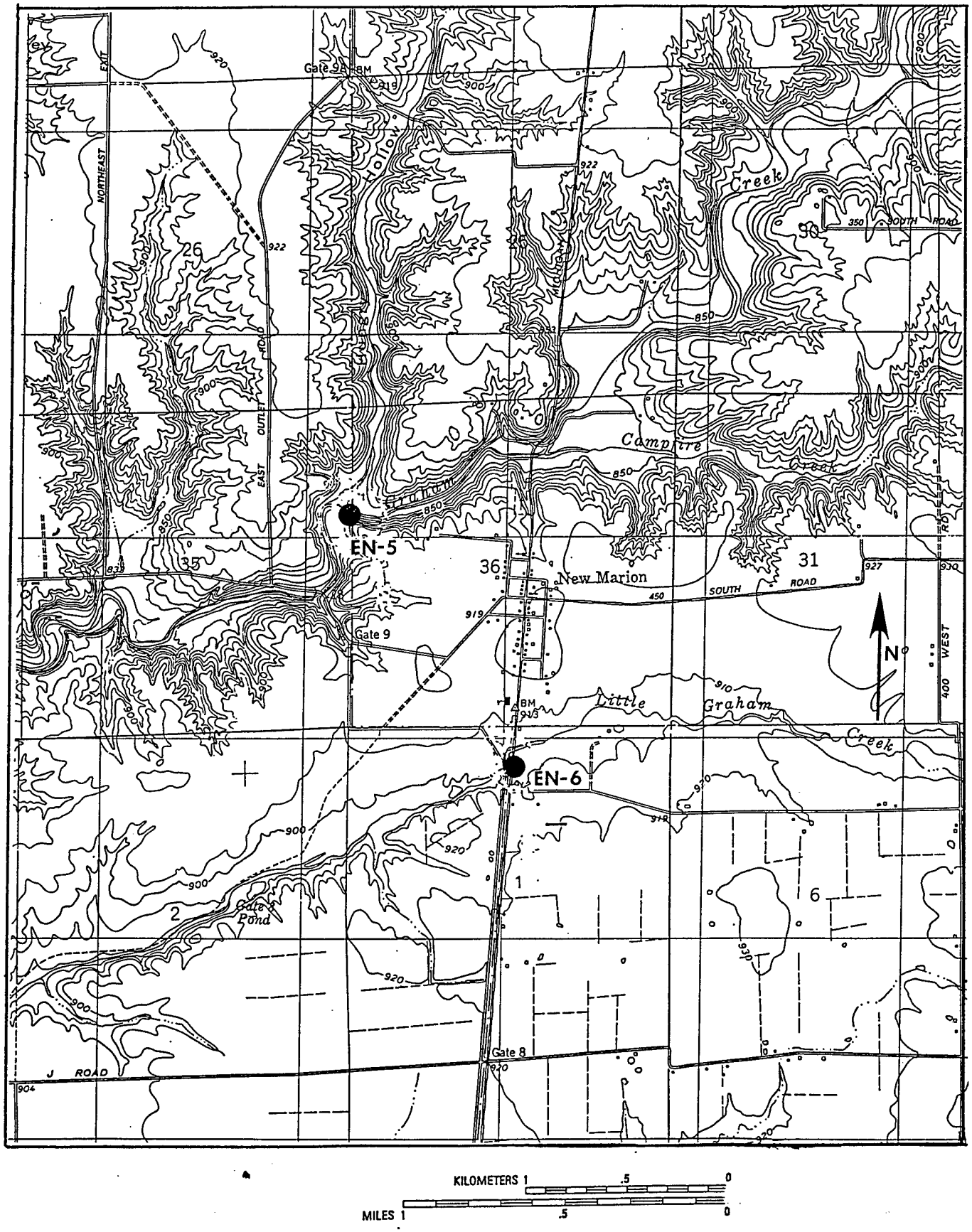

Figure 12. Stream Entrance Sample Locations 5 and 6

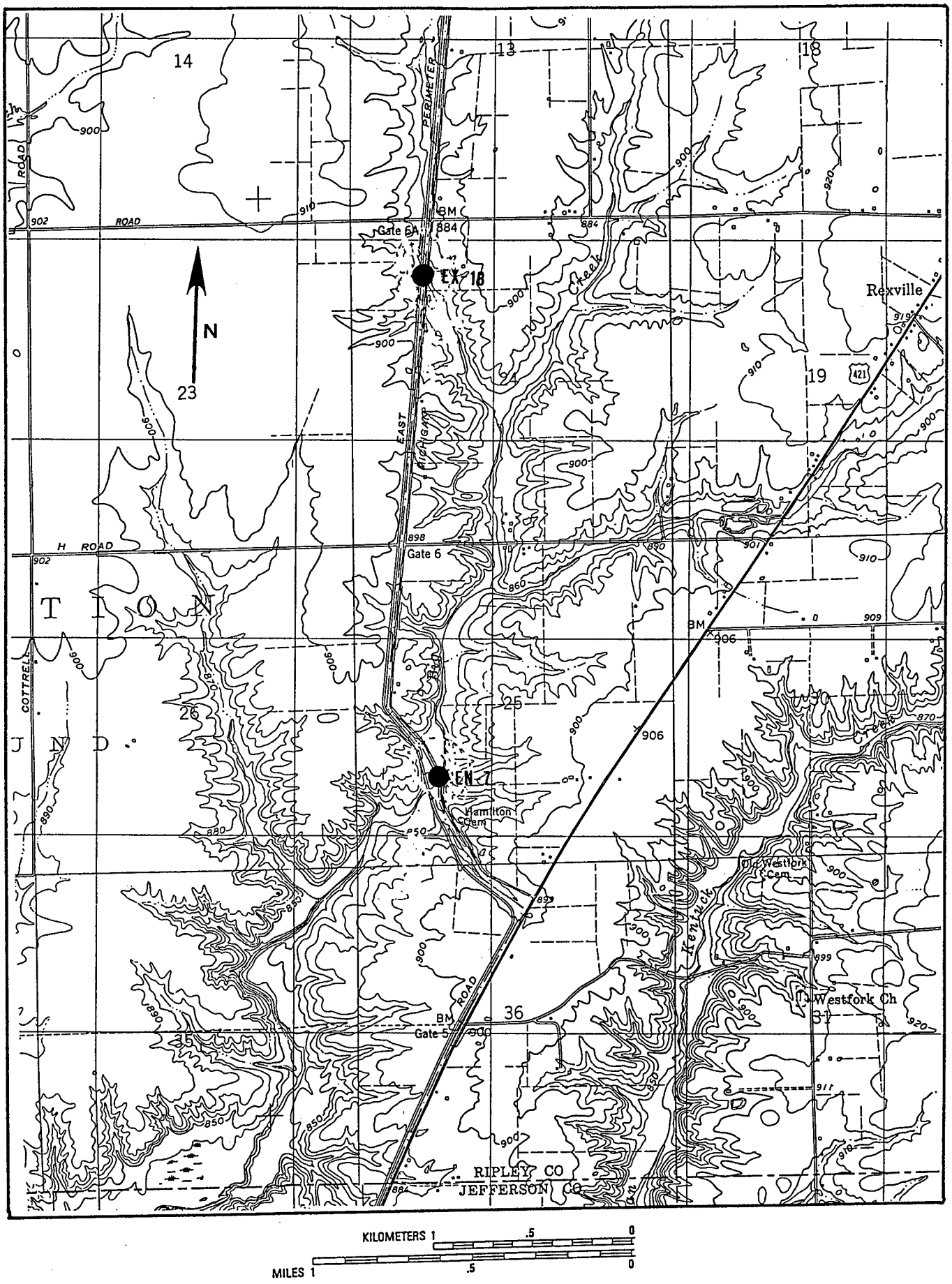

Figure 13. Stream Exit Sample Location 18 and Stream Entrance Sample Location 7

3.3.2 *Groundwater Sampling at Gate 19 Landfill*

Groundwater sampling and analysis at the Gate 19 Landfill was initiated in 1988 during the JPG RI/FS (Environmental Science and Engineering, 1989). Analysis of groundwater samples has included a range of volatile and semi-volatile organics and metals. No significant contamination has yet been detected. However, because infiltration of precipitation presents on ongoing potential for leachate generation and contaminant migration to the groundwater system, additional sampling of Gate 19 monitoring wells will be conducted during the SSSA.

Groundwater samples will be collected from the 15 existing wells at the Gate 19 Landfill. The locations of the existing Gate 19 Landfill wells are shown in Figure 14. The wells that will be sampled during this investigation are as follows:

81-2	MW-1	MW-7	MW-11
81-4	MW-2	MW-9	MW-12
83-1	MW-4	MW-10	MW-17
83-2	MW-5	MW-11	

Samples from the wells will be analyzed for Target Compound List (TCL) volatile and semi-volatile organics and total and dissolved metals. Groundwater-elevation measurements will also be made to allow calculation of hydraulic gradients and groundwater velocity estimates. Repeat water-level measurements will be conducted during any additional field work activities that take place after the initial SSSA groundwater sampling.

3.3.3 *Groundwater Sampling at DU Impact Area*

As part of a permit application prepared by JPG to obtain a Nuclear Regulatory Commission (NRC) license for the testing of DU ammunition, a groundwater monitoring program was implemented for the DU Impact Area. Groundwater samples have been collected from nine wells in the DU Impact Area and two background wells outside the DU Impact Area. Past analyses of these samples indicates that no uranium contamination has reached the groundwater at the locations monitored by the existing wells (Ebasco, 1990a and 1990b).

To determine if chemicals associated with explosive compounds have entered the groundwater system, additional groundwater sampling and analysis will be conducted at the DU Impact Area during the SSSA. Samples will be collected from each of the nine wells located in the DU Impact Area (Figure 15). These samples will be analyzed for explosive compounds (Table 1). Groundwater-level measurements will also be made immediately prior to the sampling of each of the nine wells. Repeat water level measurements will be conducted during any additional field work that takes place after the initial round of DU Impact Area well sampling. These water-level elevation data will be used to assess hydraulic gradients (directions and magnitudes) across the DU Impact Area.

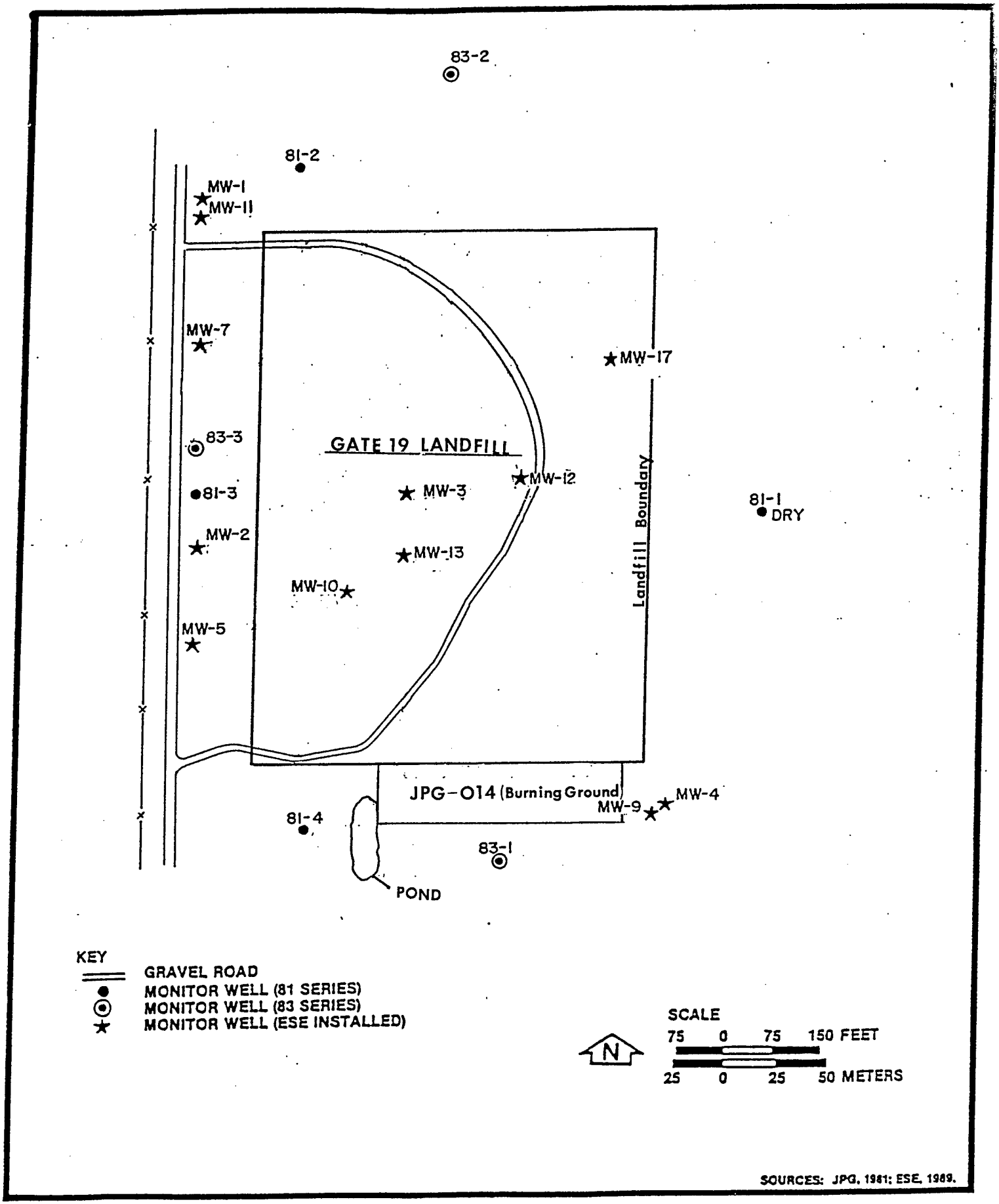

Figure 14. Gate 19 Landfill Groundwater Monitoring Well Locations

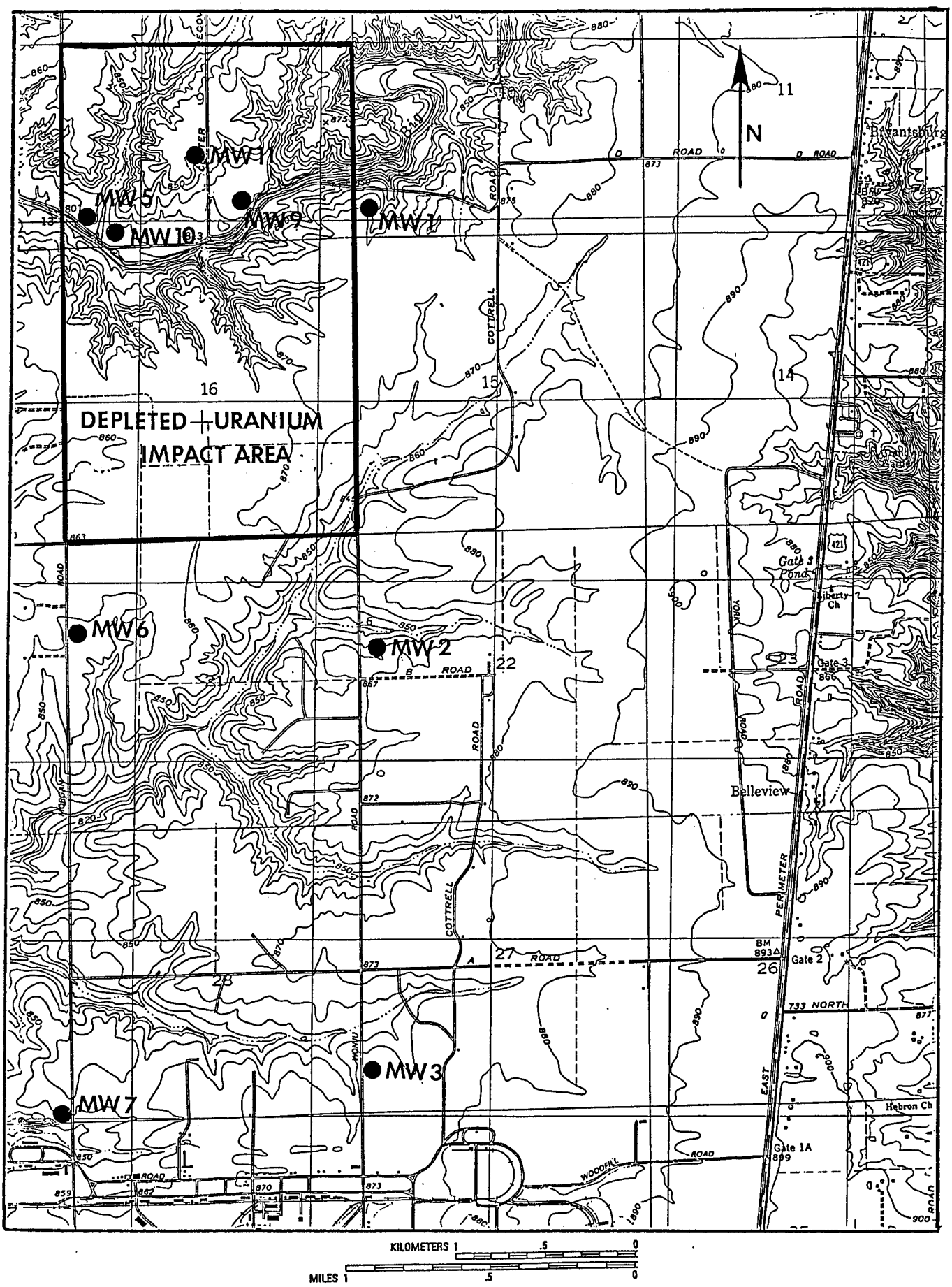

Figure 15. Depleted Uranium Impact Area Groundwater Monitoring Well Locations

Table 1. Summary of Analytes for Water and Sediment Samples Collected from Streams at Points of Entrance to and Exit from JPG.

ANALYTE	SAMPLE TYPE[a]
Herbicides	
2,4-Dichlorophenoxyacetic acid (2,4-D)	EN, EX, QA
2,4,5-Trichlorophenoxyacetic acid (2,4,5-T)	EN, EX, QA
5-Bromo-3-sec-butyl-6-methyluracil (Bromacil)	EN, EX, QA
Lithium salt of Bromacil, ethylene glycol, ethanol and methanol (Hyvar X-L)	EN, EX, QA
2-Chloro-4-ethylamino-6-isoproplyamino-5-triazine	EN, EX, QA
Pentachlorophenol	EN, EX, QA
Explosive Compounds	
Octahydro-1,3,5,7-tetrazocine (HMX)	EX, QA
Hexahydro-1,3,5-trinitro-1,3,5-triazine (RDX)	EX, QA
2,4,6-Trinitrotoluene (TNT)	EX, QA
2,4,6-Trinitrophenyl methylnitramine (Tetryl)	EX, QA
Lead azide	EX, QA
Lead styphnate	EX, QA
Lead mononitroresorcinate	EX, QA
Mercury fulminate	EX, QA
Tetracene	EX, QA
2,4-Dinitrotoluene	EX, QA
2,6-Dinitrotoluene	EX, QA
2-Amino-4, 6-dinitrotoluene	EX, QA
1,3-Dinitrobenzene	EX, QA
1,3,5-Trinitrobenzene	EX, QA
Nitrates	EX, QA
Antimony sulfide	EX, QA
Nitroglycerin	EX, QA
Nitroguanidine	EX, QA
Metals	
Dissolved TCL metals	EX, QA
Total TCL metals	EX, QA
Total Uranium[b]	EX, QA

[a]EN = entrance-point sample, EX = exit-point sample, QA = quality control sample.
[b]Uranium to be included in the analysis of samples from exit points 3, 5, 6, 7, and 8.
*Explosive compounds and uranium also to be included in analyte list for groundwater samples from DU Impact Area.

4.0 DESCRIPTION OF FIELD PROCEDURES

4.1 Introduction

This section provides a summary of the procedures that will be used to collect samples and data in the field. It is intended to serve as a guide to field crews and does not, therefore, provide complete step-by-step instructions for every sampling or data collection method. Detailed step-by-step procedures are provided in Appendix A.

Sampling tasks, locations and related information are summarized in Table 2. Any departure from the planned approach outlined in Table 2 will be documented in field logbooks and on Variance reporting forms. Analytical methods to be used for the laboratory analysis of the samples collected at JPG are listed in Table 3. Table 4 provides a cross-reference between USATHAMA anlytical method numbers (which are shown in Table 3) and EPA anlytical method numbers. Information associated with sample container types and sizes, sample preservation methods and sample holding times is presented in Appendix B.

4.2 Stream Water Sampling

When adequate water depths are available, stream-water sampling will be conducted using the bottle-immersion technique. The sample bottle is simply pointed in an upstream direction and immersed until the lip on the opening of the bottle is just below the water surface. The bottle is held at an angle, allowing the water to enter through the opening and drain gently into the bottle without bubbling or cascading. Prior to collecting the actual sample, the sample bottle will be triple rinsed with stream water from the sample location. The bottle will be capped and checked for air bubbles. If bubbles are present, the bottle will be reopened to add more water and eliminate any air from the sample. The bottle will then be capped, dried, labeled, and then cooled to 4° C in a cooler that will be sealed using custody seals, as described in Sections 5 and 6. If preservation is required for a particular set of analytes (see Appendix B), the proper amount of preservative will be added to the appropriate sample bottles just prior to capping. Proper preservation will be ensured by checking the pH prior to capping the sample bottle.

If stream depths are too shallow to permit immersion of the sample bottles, filling will be accomplished by using a stainless steel sample ladle or peristaltic pump. Samples will be collected by dipping the ladle in the stream and then gently pouring the water into the sample bottle, while holding the bottle at an angle. This will allow the water to run down the side of the bottle without bubbling or cascading. Samples collected from exit stream locations for dissolved metals analysis will initially be collected in a large Teflon reservoir, using either a stainless steel sample ladle or a peristaltic pump. Individual samples will then be prepared by transferring the sample

Table 2. Summary of Sampling Activities at JPG

Site	Location	Sample Type	Sample ID	Sampling Technique	Analytes
Stream Entrances	Eight stream entrance points	Surface water	JPG-SW-001 thru 009	Bottle Immersion	Herbicides and total uranium
		Sediment	JPG-SE-001 thru 009	Stainless steel scoop or spoon	Herbicides and total uranium
Stream Exits	Nineteen stream exit points	Surface water	JPG-SW-009 thru 027	Bottle Immersion and peristaltic pump	Herbicides, explosives, metals, and total uranium
		Sediment	JPG-SE-009 thru 027	Stainless steel scoop or spoon	Herbicides, explosives, metals, and total uranium
Gate 19 Landfill	Fifteen existing monitoring wells	Groundwater	JPG-GW-G19-well #	Bladder or peristaltic pump	VOCs, semi-VOCs,and metals
DU Impact Area	Nine existing monitoring wells	Groundwater	JPG-GW-DUI-well #	Bladder or peristaltic pump	Explosives

4.3 Stream Sediment Sampling

Sediment samples will be collected from the stream bottoms using two stainless steel spoons or scoops. Using the second scoop to hold the sample in the first scoop, water will be drained from the sample, and the sample will then be placed in the sample container. Sample bottles will be completely filled prior to capping. During sampling, every effort will be made to avoid inclusion of any material that is gravel-size or larger. After each sample bottle is filled, it will be capped, dried, labeled, and then cooled to 4° C in a cooler that will be sealed using custody seals, as described in Sections 5 and 6.

4.4 Groundwater Sampling

Groundwater samples will be collected using positive displacement bladder pumps constructed of stainless steel and Teflon. Prior to collecting a sample from a well, the well will be purged to remove stagnant water and provide for a sample that is representative of the true chemistry of the flowing groundwater. A minimum of 5 bore volumes will be purged from each well prior to sampling. Calculation of bore volumes will include water contained in the filter pack and annular space around the well casing.

While each well is being purged, the discharge water will be monitored for temperature, electrical conductivity (EC), and pH. Temperature, EC, and pH probes will be installed in a flow-through cell that is connected to the purge-water discharge line.

For samples requiring preservation (Appendix B), the proper amount of preservative will be added to the sample bottle prior to filling. Samples for dissolved-metals analysis will be collected by installing an inline 0.45 micron cellulose-acetate filter cartridge in the discharge line. Sample bottles will be filled by holding the sample bottle at and angle and placing the discharge line at the lip of the bottle opening. The discharge water will be allowed to flow gently down the side of the bottle without bubbling or cascading. This will prevent induced volatilization of organics. After filling a sample bottle, the bottle will be capped and checked for air bubbles. If bubbles are present, the cap will be removed and additional sample water will be added to the bottle so as to eliminate all bubbles.

Table 3. Definition of Analytical Parameters and Analytical Methods

Acronym in Text	Laboratory Parameters	Analytical Method
	Target Compound List (TCL)	
VOCs	1) Volatile Organic Compounds	USATHAMA UM17
	acetone	
	benzene	
	bromodichloromethane	
	bromoform	
	bromomethane	
	2-butanone	
	carbon disulfide	
	carbon tetrachloride	
	chlorobenzene	
	chloroethane	
	chloroform	
	chloromethane	
	dibromochloromethane	
	1,1-dichloroethane	
	1,2-dichloroethane	
	1,1-dichloroethene	
	1,2-dichloroethene (total)	
	1,2-dichloropropane	
	cis-1,3-dichloropropene	
	trans-1,3-dichloropropene	
	ethylbenzene	
	2-hexanone	
	methylene chloride	
	4-methyl-2-pentanone	
	styrene	
	1,1,2,2-tetrachloroethane	
	tetrachloroethene	
	toluene	
	1,1,1-trichloroethane	
	1,1,2-trichloroethane	
	trichloroethene (TCE)	
	vinyl acetate	
	vinyl chloride	
	xylenes (total)	

Table 3, continued. Definition of Analytical Parameters and Analytical Methods

Acronym in Text	Laboratory Parameters	Analytical Method
Semi-VOCs	2) Semi-Volatile Organic Compounds	USATHAMA UM16
	acenaphthene	
	acenaphthylene	
	anthracene	
	benzo(a)anthracene	
	benzo(b)fluoranthene	
	benzo(k)fluoranthene	
	benzoic acid	
	benzo(g,h,i,)perylene	
	benzo(a)pyrene	
	benzyl alcohol	
	bromophenyl phenyl ether	
	4-chloroaniline	
	bis(2-chloroethyl)ether	
	bis(2-chloroethoxy)methane	
	bis(2-chloroisopropyl) ether	
	butyl benzyl phthalate	
	4-chloro-3-methylphenol	
	2-chloronaphthalene	
	2-chlorophenol	
	4-chlorophenyl phenyl ether	
	chrysene	
	dibenz(a,h)anthracene	
	dibenzofuran	
	1,2-dichlorobenzene	
	1,3-dichlorobenzene	
	1,4-dichlorobenzene	
	3,3-dichlorobenzidine	
	2,4-dichlorophenol	
	diethylphthalate	
	2,4-dimethylphenol	
	dimethyl phthalate	
	di-n-butyl phthalate	
	di-n-octyl phthalate	
	2,4-dinitrophenol	
	4,6-dinitro-2-methylphenol	
	2,4-dinitrotoluene	
	2,6-dinitrotoluene	
	bis(2-ethylhexyl)phthalate	

Table 3, continued. Definition of Analytical Parameters and Analytical Methods

Acronym in text	Laboratory Parameters	Analytical Method
Semi-VOCs continued	2) Semi-Volatile Organic Compounds	USATHAMA UM16
	fluoranthene	
	fluorene	
	hexachlorobenzene	
	hexachlorobutadiene	
	hexachlorocyclopentadiene	
	hexachloroethane	
	indeno(1,2,3-c,d)pyrene	
	isophorone	
	2-methylnaphthalene	
	2-methylphenol	
	4-methylphenol	
	naphthalene	
	2-nitroanaline	
	3-nitroanaline	
	4-nitroanaline	
	nitrobenzene	
	2-nitrophenol	
	4-nitrophenol	
	n-nitroso-di-n-dipropylamine	
	n-nitrosodiphenylamine	
	pentachlorophenol	
	phenanthrene	
	phenol	
	pyrene	
	1,2,4-trichlorobenzene	
	2,4,5-trichlorophenol	
	2,4,6-trichlorophenol	
	Target Analyte List Metals	
Metals	1) ICP Metals	USATHAMA SS16(water) USATHAMA JS15(sed.)
	antimony	
	beryllium	
	cadmium	
	chromium	
	copper	
	nickel	

Table 3, continued. Definition of Analytical Parameters and Analytical Methods

Acronym in text	Laboratory Parameters	Analytical Method
	thallium	
	zinc	
	2) GFAA Metals	
	lead	USATHAMA SD24(water)
	selenium	USATHAMA JC03, JD13
	arsenic	(sed.)
	silver	
	mercury	USATHAMA SB03(water) USATHAMA JB03 (sed.)
	Herbicides	
Herbicides	2,4-Dichlorophenoxyacetic acid (2, 4-D)	UW31/LW29
	2,4,5-Trichlorophenoxyacetic acid (2,4,5-T)	
	2-Chloro-4-ethylamino-6-isoproplyamino-5-triazine	
	Pentachlorphenol	UJ04/LJ04
	Lithium salt of Bromacil, in ethylene glycol, NA/NA[a]	
	ethanol and methanol (Hyvar X-L)	
	5-Bromo-3-sec-butyl-6-methyluracil (Bromacil)	
	Explosive Compounds	
Explosives	Octahydro-1,3,5,7-tetrazocine	UW26/LW26
	Hexahydro-1,3,5-trinitro-1,3,5-triazine (RDX)	
	2,4,6-Trinitrotoluene (TNT)	
	2,4,6-Trinitrophenyl methylnitramine (Tetryl)	

Table 3, continued. Definition of Analytical Parameters and Analytical Methods

Acronym in text	Laboratory Parameters	Analytical Method
Explosives continued,	Lead azide	
	Lead styphnate	
	Lead mononitroresorcinate	
	Mercury fulminate	
	2,4-Dinitrotoluene	
	2,6-Dinitrotoluene	
	1,3-Dinitrobenzene	
	1,3,5-Trinitrobenzene	
	Nitrates	
	Antimony sulfide	
	2-Amino-4, 6-dinitrotoluene NA/NA[a]	
	Tetracene	
	Nitroglycerine	
	Nitroguanidine	

[a]NA indicates analytical method is still in development and not yet certified by USATHAMA

TABLE 4

ADL USATHAMA METHODS CORRELATION TO EPA METHODS

ADL USATHAMA METHOD	DESCRIPTION	EPA METHOD
JS15, SS16	Metals by ICP	200.7[a]
JD13, SD24	Metals (AS,SE,AG,PB) by AA GF	206.2, 270.2, 272.2 239.2[a]
JB03, SB03	Mercury by AA CV	245.2[a]
KY02, TY12	Cyanide	335.5[a]
KT04, TT08	Anions by IC	300[a]
LM16, UM33	Volatiles Organics by GC/MS	8240[b], 624[c]
LM15, UM16	Semivolatile Organics by GC/MS	8270[b] 625[c]
LW26, UW26	Herbicides by HPCL	-
LN03, UN05	NP Pesticides by GC/NPD	507[d]
Not Certified	Bromacil by GC/ECD	507[d]

[a] Methods for Chemical Analysis of Water and Wastes, EPA-600/4-79-020.

[b] Test Methods for Evaluating Solid Waste, SW-846, November 1986.

[c] 40 CFR Part 136.

[d] Methods for the Determination of Organic Compounds in Finished Drinking Water and Raw Source Water, September 1986.

Please note that the USATHAMA methods employed by Arthur D. Little follow the basic procedures described in these cited EPA methods. Minor modifications have been developed in these methods to provide the low detection limits (certified reporting limits), maximum analytical concentration ranges and specific quality control and acceptance criteria required by the USATHAMA programs.

After bottles have been capped and verified to be free of air bubbles, they will be labeled, and then cooled to 4° C in a cooler that will be sealed using custody seals as described in Sections 5 and 6.

4.5 Groundwater-Elevation Measurements

Water-level elevation measurements will be made at each monitoring well prior to collecting samples. This information, together with total well depths, will allow the sampling team to calculate the minimum volume of water to be removed from the well during purging. Water-level measurements will also be used in conjunction with surveyed well-casing elevations to determine actual groundwater elevations relative to a common datum, such as the National Geodetic Mean Sea Level Datum (MSLD). Contour maps will then be prepared from the groundwater elevation data. These maps will allow interpretation of local groundwater flow directions at the Gate 19 Landfill and the DU Impact Area.

4.6 Decontamination Procedures

All equipment used for the collection of water, sediment, or QA/QC samples will be decontaminated prior to first use at JPG and between use at each sample location at JPG.

For all durable parts, decontamination will include steam cleaning, a potable (or bottled) water rinse, and a deionized (DI) or distilled water rinse. Samples from the potable water and DI water sources will be collected and analyzed for all project analytes prior to use for any decontamination procedures. Upon USATHAMA approval of the results of these analyses, the tested water supplies can be used for decontamination procedures.

Fragile parts, such as the Teflon bladders and seals used in submersible bladder pumps, will not be steam cleaned during decontamination procedures. These components of the sampling equipment will be decontaminated by a potable water wash followed by a DI or distilled water rinse, only.

5.0 SAMPLE HANDLING PROCEDURES AND PROTOCOLS

5.1 Sampling Requirements

A single sample of water or sediment from any given sampling location may require the preparation and filling of multiple sample bottles that will be analyzed for different groups of analytes upon reaching the laboratory. Each sample container will be assigned a unique sample number that identifies the sample relative to the project (JPG), the sample media (SE, SW, or GW), and the sampling location or well

number (as defined in Table 2). When multiple containers are required for a single sample (due to different handling protocols for different groups of analytes), each container will have the same sample number. The analyses to be conducted on each individual container will also be marked on the sample label. USATHAMA requirements regarding sample containers, sample preservation and maximum sample holding times will be adhered to for all samples collected. These requirements are listed in Appendix B.

5.2 Sample Handling and Shipping

All sample bottles and containers will be supplied as pre-cleaned containers from the USATHAMA-approved laboratory, Arthur D. Little, Inc. Containers will be visually inspected for cleanliness and integrity prior to filling. Suspect containers will be marked "Do Not Use" and will be discarded.

Sample bottles for inorganic analyses will be filled to 90 percent of capacity to allow for expansion of the contents. Organic sample containers will be filled with no headspace or bubbles.

Sample preservation, when required, will be performed immediately after a sample container has been filled. For acidified samples, pH will be checked before the sample bottle is capped to ensure proper preservation. Ice chests will be used to cool samples during field sampling, packaging, and shipping.

Because all samples are expected to have minimal concentrations of contaminants, the samples will be packaged and shipped as environmental samples. All samples will be packaged and shipped in a manner that will protect the integrity of the sample and minimize the potential for detrimental effects from sample leakage. Packaging and shipping will include placing sample containers in zip-lock plastic bags and packing samples in vermiculite. Samples placed in partially-full shipping containers will also be packed in foam shipping cells.

6.0 QUALITY CONTROL

6.1 Introduction

This section provide a brief introduction to the QA/QC measures that will be adhered to during the field work conducted during the SSSA. The objective of these measures is to provide systematic control of all phases of the investigation including sample collection, documentation, analysis and reporting. A detailed description of the QA/QC procedures that will govern the entire SSSA project is provided in Volume III, RI/FS Quality Control Plan (QCP). The RI/FS QCP has been adopted for this

work because the field and analytical work conducted during the SSSA is virtually identical to that conducted during the RI/FS.

6.2 Sampling Procedures

Brief descriptions of the sampling procedures are described in Section 4 of this document. Detailed descriptions of these procedures are provided in Appendix A. Any deviations from the procedures presented in this document will be noted in the field logbooks. Explanations will include assessments of potential impacts to data quality.

6.3 Sample Control

6.3.1 *Sample Identity*

To maintain evidence of authenticity, the samples collected must be properly identified and easily differentiated from other similar samples. Samples collected for JPG will be identified by means of a label attached to the sample container. This label will include the sample identification number, date collected, time collected, desired analyses, and the samplers name. In addition, a tag will be attached to the sample container with the same information as that recorded on the sample label. This sample tag will be kept in the project evidentiary files.

6.3.2 *Sample Custody*

To maintain the integrity of the samples, it is necessary to demonstrate that the samples were kept under custody from the time they were collected until the time they were analyzed. Chain of Sample Custody records (Figure 16) will be used to list all transfers of sample possession. This document will demonstrate that samples were in constant custody between collection and analysis.

While the samples are being shipped, the shipping container will have custody seals placed over the container opening to allow one to determine if the samples were tampered with during shipment. the receiving laboratory will examine the seals upon arrival and will record the condition of the seals (intact, or compromised). Upon opening the container, the condition of the sample containers will also be noted and recorded (i.e., broken or leaking bottles, broken seals on lids, etc.).

Cooler Number: _____ of _____

CHAIN OF CUSTODY RECORD

Page _____ of _____

PROJ. NO.	PROJECT NAME						Analyses								Remarks	SAMPLE CONDITION UPON RECEIPT
SAMPLERS: *(Signature)*																
SAMPLE/ STATION NUMBER	DATE	TIME	*COMP	*GRAB	STATION LOCATION	PRESERVATION										

Relinquished by: *(Signature)*	Date/Time	Received by: *(Signature)*	Shipped to:
Relinquished by: *(Signature)*	Date/Time	Received by: *(Signature)*	
Relinquished by: *(Signature)*	Date/Time	Received for Laboratory by: *(Signature)*	Date/Time / Carrier:

Distribution: Original Accompanies Shipment; Yellow Copy to Case Manager; Pink Copy for Field Files

*Letter denotes sample matrix
W - Water S - Soil LW - Liquid Waste SW - Solid Waste

Figure 16. Example of Chain of Sample Custody form

6.4 Document Control

6.4.1 *Introduction*

To maintain QA/QC standards, all field activities will be documented using a combination of field logbooks, and data collection forms. Sampling teams will maintain strict control of these documents at all times to prevent tampering. The specific documents that will be maintained during the SSSA are described in this section.

6.4.2 *Field Logbooks*

Bound logbooks with consecutively numbered pages will be used by field personnel for all sampling activities. The logbooks will be used to record the daily activities of each field team, record any field measurements taken, sketch sample location maps, and note observations relevant to the quality of the data or sample. Each page will be signed and dated by the person making the entries on that page and will also be signed and dated by a second person who has reviewed the entries for clarity and accuracy.

Each logbook that is issued will be signed out by the individual responsible for completion of the logbook. This record will be part of the overall Document Control Log. When the logbooks are returned, the receiver will sign and date the return.

6.4.3 *Instrument Calibration Log*

An instrument calibration log will be kept for instruments requiring daily calibration or operational checks. This log will ensure that the data obtained are within established QA/QC limits. Included in the logbook will be the date of the calibration, the type of calibration performed, standards used, and the QA limits established for each instrument. Instruments that fail calibration or operational checks will be tagged "DO NOT USE."

6.4.4 *Groundwater Sample Collection Forms*

A groundwater sample collection form will be completed for each sampling location (Figure 17). This form is a comprehensive form that documents water quality field measurements taken during the purging and sampling of individual wells. Information recorded includes water-quality indicator parameters, pump type, purge volumes and rates, and types of sample bottles preservatives and filters used.

WATER QUALITY FIELD DATA SHEET

PROJECT:

SAMPLERS:

DATE TIME
START
FINISH

WELL ID:

WELL INFORMATION

DEPTH TO WATER:_____Ft.
WELL DEPTH: _____Ft.
SAMPLE DEPTH: _____Ft.

CASING DIA.:_____In.

CASING VOL.:_____Gal.

STICKUP:_____Ft.
SCREENED INTERVAL:
_____ TO _____Ft.

FIELD EQUIPMENT

pH Meter_____ Serial No._____ Water Level Meter_____ Serial No._____
E.C.Meter_____ Serial No._____ D.O. Meter _____ Serial No._____
Pump_____ Serial No._____ Temperature Meter_____ Serial No._____
Pumping Rate_____gal/min Filter Apparatus_____ Filters_____
Tubing _____ Size_____in (x) _____in Bailer_____ Size _____in.

ANALYSIS

Time	Volume Removed		Temp °C	Elec Cond µ mhos/cm	pH	D.O. mg/l	Safety Procedures/ Readings
	Gals	Csng Vols					

ARE THERE ADDITIONAL PAGES YES NO TOTAL PAGES =_____ CNES FORM WTRQAL-291

Figure 17. Groundwater sample collection form (front side)

ANALYSIS WATER QUAL. FIED DATA **(CONTINUED)** PAGE______OF______

DATE ______________WELL ID:______________________

Time	Volume Removed		Temp °C	Elec Cond µ mhos/cm	pH	D.O. mg/l	Safety Procedures/ Readings
	Gals	Csng Vols					

ARE THERE ADDITIONAL PAGES **YES** **NO** TOTAL PAGES=__________ **CNES FORM WTRQAL-291/2**

Figure 17 (cont). Groundwater sample collection form (back side)

6.4.5 *Chain-of-Custody Forms*

A copy of each chain-of-custody form (Figure 16) will be retained in a project field-file in order to provide traceability in the event of sample loss or delay during shipment. This file will be maintained in the field until completion of the fieldwork, and then will become part of the permanent project files after completion of the project. Copies received by the laboratory will also be maintained in a project file until completion of the analytical work, after which they will be transferred to the permanent project files.

6.4.6 *Project Evidentiary File*

The project manager, or designee, will maintain a project file that will include all pertinent information gathered during field and laboratory work. This will include access permits, project correspondence, completed data forms and logbooks, training records accident reports and other records and files required to maintain a complete record of all project activities. At the completion of the project, a copy of all project files will be forwarded to CETHA for permanent storage.

6.5 Quality Control Samples

6.5.1 *Field QC Samples*

Field QC samples will include field duplicates, equipment blanks, and trip blanks. Field duplicates are defined as duplicate samples of the media being sampled. Equipment blanks are samples prepared using the cleaned sampling equipment to collect and bottle a sample of the media of interest known to contain no contaminants. The typical approach to collecting equipment blanks for water sampling equipment is to use deionized water that is passed through pumps and filters used during normal sampling. Equipment blanks for soil or sediment sampling are prepared using deionized water as a rinsate over the sampling equipment. Trip blanks are clean samples that are prepared in the laboratory prior to departure to the field. These samples are carried throughout the field work phase and are submitted to the laboratory either during or after completion of the field work. Trip blanks provide checks on the potential for sample bottle contamination or laboratory contamination of samples after receipt. Field QC samples (excluding trip blanks) will include 10% duplicates, 5% equipment blanks and one trip blank per shipment of VOC samples.

6.5.2 *Laboratory QC Samples*

Laboratory QC sample requirements are a function of the classification of the analytical method (USATHAMA, 1990). All USATHAMA laboratory QC requirements specified in Section 11 of USATHAMA (1990) will be adhered to.

These Laboratory QC requirements are described in greater detail in Volume III, RI/FS Quality Control Plan.

7.0 HEALTH AND SAFETY

Health and safety protocols that will be adhered to during SSSA field work at JPG are presented in Volume IV, RI/FS Health and Safety Plan. This plan has been adopted for coverage of health and safety issues during the SSSA because the field work tasks conducted during this investigation virtually identical to those that will be conducted during the planned RI/FS. The RI/FS Health and Safety Plan is a comprehensive plan that describes the health and safety responsibilities of CNES personnel, protective equipment requirements, potential contaminants and their exposure limits, emergency response plans, and spill abatement and cleanup procedures.

To ensure that field personnel understand the health and safety requirements and are aware of the potential health and safety hazards posed by the SSSA activities, the Field Manager will conduct daily health and safety briefings. These briefings will address the most significant health and safety concerns posed by the sampling activities planned for the given day.

All personnel will have received the 40-hour Hazardous Waste Site Safety Training course from a certified instructor.

8.0 REFERENCES

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APPENDIX A

DETAILED PROCEDURES FOR FIELD SAMPLING AND DATA COLLECTION ACTIVITIES

SURFACE SOIL SAMPLING

INTRODUCTION

For samples to be collected from a depth of 0-6 inches, a stainless steel scoop or trowel will be used for sample collection. For samples over 6 inches in depth, a hand-operated stainless steel barrel auger will be used. The barrel auger maintains a consistent sample volume and allows better depth control. Sediment sampling at JPG will also employ this procedure since the stream drainages at JPG are shallow and often dry.

SIGNIFICANCE AND USE

Samples will be obtained for the determination of the presence or absence of chemical contamination in the near-surface soil environment. The sampling equipment used and the procedures are designed to minimize the potential for cross-contamination between samples and to obtain samples of a relatively uniform depth and volume.

APPARATUS

Surface soil sampling will utilize a stainless steel spoon, scoop, or trowel to excavate a hole over a small area (< 1 foot) to a depth of 6 inches. The barrel auger consists of a stainless steel, 3-inch-diameter auger tube with cutting tips hardened and sharpened to penetrate the soil. Attached to the upper end of the auger barrel is a threaded stainless steel extension rod to which a T-handle is attached. The auger assembly is rotated by hand in a clockwise direction.

PROCEDURE

1. Clear immediate sampling area of debris or litter.

2. For the spoon or scoop method, first collect samples for VOC analysis by placing the sample material directly into the sample container with minimal head space to minimize VOC loss. Place remaining material in a precleaned stainless steel pan and thoroughly mix the material with a stainless steel spoon. Place the mixed sample into the appropriate sample containers.

3. For the barrel auger sampling method, auger to the desired sampling depth. When the desired depth is reached, remove the auger. If a sample for VOC analysis is required, remove the material immediately using a stainless steel spoon and place in the appropriate container with no headspace to prevent volatile loss. Place the remainder of the sample material in a precleaned stainless steel pan and mix thoroughly with the spoon. Transfer the sample material from the pan to the appropriate containers with the spoon.

4. With a clean paper towel, clean the outside threads of the bottle prior to placing the lid on the bottle, since dirty threads often result in a poor seal. A tight seal is essential to prevent escape of the sample or specific chemical contaminants within the sample.

5. Wrap a seal of parafilm tape around the bottle and lid to secure the lid.

6. Measure the actual sampling depth using a steel measuring tape and record on the soil sample log sheet.

7. Note any unusual characteristics observed such as color, texture, or odor on the log sheet.

8. Record the sampling time, date, sampler's name, sample ID number, and requested analytical parameters on the sample bottles and sample log sheet. Once the sample tag is completed for each container, cover the tag with clear tape to protect it from moisture.

9. Prepare and store the samples as specified in Sections 4, 5, and 6 of this plan.

10. Decontaminate all sampling equipment that came into contact with potentially contaminated materials as specified in the decontamination procedures described in Section 5.7 of the Sampling Design Plan.

MEASUREMENT OF WATER LEVELS IN GROUNDWATER MONITORING WELLS

INTRODUCTION

Water-level measurements will be taken prior to any sampling or well purging. These measurements are needed to determine the casing volume of water in the well; the data is used when interpreting the monitoring results. High water levels could indicate recent recharge to the system, resulting in dilution of the sample. Low water levels may reflect the influence of nearby production wells. Documentation of the non-pumping water levels will also provide historical information on the hydraulic conditions at the site.

SCOPE

The water-level measurements will be made from the top of the well casing and, for consistency, will always be made from the same spot on the well casing (typically on the north side of the casing).

Two methods are provided for water-level measurements. The first utilizes an electric sounder with a conductivity cell. When the cell contacts water, it completes an electrical circuit and sounds a buzzer or lights a lamp. The second method uses an interface probe. This instrument has an optical liquid sensor and a conductivity cell and can distinguish between the presence of a non-conductive layer (i.e., oils and fuels) and a conductive layer. With this instrument, the sampler can measure the thickness of a light-phase immiscible (floater) or dense-phase immiscible (sinker) layer.

SIGNIFICANCE AND USE

Accurate measurements of water depth are necessary to calculate well-bore volumes; measurements are typically made to the nearest 0.01 foot.

APPARATUS

Electric Sounder or Interface Probe (many commercial brands are available)

PROCEDURE

1. Ensure that the sounder or interface probe is clean by rinsing with distilled water and wiping clean with a lint-free disposable tissue.

2. Perform a battery check.

3. Slowly lower the probe into the well until the indicator sounds or lights. In the case of the interface probe, a continuous audible alarm indicates an immiscible non-conductive liquid and an oscillating alarm indicates water.

4. Raise the probe slightly until the indicator stops sounding or the light goes off. Lower the probe again until the indicator sounds and read the depth to the nearest 0.01 foot. Repeat this step until a repeatable measurement is achieved (to the nearest 0.01 foot).

5. If a dense-phase immiscible layer is suspected, it can be measured by slowly lowering the interface probe to the bottom of the well. If the layer is present, it can be measured by recording the point at which the continuous alarm begins and the point that the probe reaches the bottom of the well.

6. Slowly withdraw the probe from the well while wiping the tape with a clean lint-free tissue moistened with distilled water.

7. Clean the probe by rinsing with distilled water and wiping dry with a lint-free tissue.

PURGING OF MONITORING WELLS

INTRODUCTION

To obtain a representative groundwater sample, the stagnant water in the well casing must be removed. The recommended amount of purging depends on many factors such as the hydrogeological nature of the aquifer, the characteristics of the well, the type of sampling equipment to be used, and the parameter to be sampled. USATHAMA requirements call for the purging of five bore-volumes. In addition to the established number of bore volumes, water quality parameters of pH, conductivity, and temperature will be measured to indicate when the stagnant water has been sufficiently removed (the measurements stabilize).

SCOPE

The four methods described here are representative of those generally used to purge monitoring wells. Each method has advantages and disadvantages that must be considered. Proper selection will be based on such variables as the total volume of material to be removed, depth of water to be removed, and chemical contaminants present.

SIGNIFICANCE AND USE

Water may become stagnant in a well and will not reflect the local resident water's chemical and physical properties. The purging of a well can reduce this bias. Care shall be taken to allow screened intervals to come to equilibrium before sampling is performed.

CALCULATION OF VOLUME OF STANDING WATER IN THE WELL

Calculations are performed for the amount of water in the well with the following formula:

$r^2 \times \pi \times (h1 - h2) \times 7.48 =$ gallons per casing volume

where

r = radius of well casing (feet)
h1 = depth of well (feet) from the top of the well casing
h2 = depth to water (feet) measured from the top of the well casing

WELL PURGING PROCEDURES

Peristaltic Pump

Apparatus:

Peristaltic-type pump
Silicone or neoprene tubing for pump head
Silicone, Teflon, polyethylene, or vinyl tubing for placing in the well
Generator or other source of electricity

Procedure:

1. Place the suction line in the well so it is just below the liquid surface.

2. Connect the suction line to the pump.

3. Connect the pump outlet to the in-line flow cell or place the pump outlet hose into an open container to be used to make the field measurements of pH, conductivity, and temperature.

4. Place calibrated pH, conductivity, and temperature electrodes into the in-line flow cell or the open container.

5. Initiate pumping and follow the water level down the well bore if the recovery rate of the well is below the pumping rate. Discharge hose should be placed in the tank or barrel for containment.

6. Routinely monitor and record the volumes purged and the readings for the pH, conductivity, and temperature.

7. When the calculated volume of water in five bore-volumes has been purged from the well, discontinue pumping. Sampling can now begin.

8. Remove the suction line from the well if sampling is not to be accomplished with the pump (i.e., sampling with a bailer).

9. Decontaminate the equipment according to the procedure described in Section 5.7 of the Sampling Design Plan.

NOTE: Purging with a peristaltic pump is normally limited to situations where the water levels are less than about 25 feet. Also degassing occurs using this method when there is a head difference between the pump and the water level.

Bladder-type Pump

Apparatus:

Bladder-type pump
Air compressor
Teflon, polyethylene, or vinyl tubing for the air and sample line

Procedure:

1. Lower the pump gently to a position just above the screened interval.

2. Connect the air line to the pump controller.

3. Connect the pump outlet to an in-line flow cell or place the pump outlet hose in an open container used to make field measurements.

4. Place calibrated pH, conductivity, and temperature electrodes in the flow cell or the open container.

5. Initiate pumping and routinely monitor and record the volume purged and the pH, conductivity, and temperature measurements.

6. During pumping, discharge the water to a containment tank or 55-gallon barrels.

7. When five bore-volumes have been purged from the well, discontinue pumping.

8. Remove the pump from the well and decontaminate all purging equipment according to decontamination procedures described in Section 5.7 of the Sampling Design Plan.

NOTE: Pumping rates for this type of pump are typically slow, there is a high rate of air consumption, and decontamination of the equipment is more difficult than with other methods.

Bailer

Apparatus:

Teflon or Stainless Steel Bailer
Teflon or Stainless Steel Cable or Line
Bailer Reel

Procedure:

1. Attach the bailer to the cable or line which is contained on a handled reel.

2. Lower the bailer until it contacts the liquid.

3. Allow the bailer to sink until it is totally submerged.

4. Slowly raise the bailer to the surface.

5. Tip the bailer or use a bottom-emptying device and fill a container in which calibrated pH, conductivity, and temperature probes have been placed.

6. Continue bailing and emptying until five bore volumes have been bailed. As the container is filled, the purge water will be transferred to a larger container (i.e., tank or 55-gallon drum) for containment and storage. Measurements of pH, conductivity, and temperature will be made periodically in the smaller container (typically a 5-gallon bucket).

7. Clean and decontaminate the bailer as required. If the well has a dedicated bailer, the bailer will not have to be decontaminated.

NOTE: Use of a bailer for deep or large diameter wells is labor intensive and time consuming. Degassing, aeration, and turbulance will occur with this method. Also, it is difficult to determine the depth to which the bailer has been submerged.

Submersible Pump

Apparatus:

Submersible-type Pump
Discharge tubing of vinyl, polyethylene, polyvinyl chloride, or Teflon
Power source of generator or batteries

Procedure:

1. Set up the pump according to the manufacturer's operating manual.

2. Gently lower the pump down the well so that the pump head is submerged sufficiently and will not run dry.

3. Connect the pump outlet to an in-line flow cell or place the pump outlet in an open container used for field measurements.

4. Place calibrated pH, conductivity, and temperature electrodes in the flow cell or the open container.

5. Initiate pumping and continue pumping until five bore volumes have been purged. Discharge will be placed in tanks or 55-gallon drums for containment and storage. During pumping, continue to monitor pH, conductivity, and temperature.

6. Remove the pump from the well and decontaminate the equipment according to decontamination procedures described in Section 5.7 of the Sampling Design Plan.

NOTE: The high pumping rate and the mechanical action of this type of pump causes turbulence, aeration, and degassing of the water. Also these pumps are easily damaged by dry pumping. The equipment may be difficult to clean and decontaminate.

DOCUMENTATION REQUIREMENTS

The following information must be recorded prior to or during the purging of a well:

- Depth to water
- Depth of well
- Well diameter or radius
- Calculated water volume
- Type of equipment used to evacuate the well
- Date
- Well ID
- Name of person(s) performing the purging
- Total volume purged
- pH, conductivity, and temperature measurements and time or volume when taken

FIELD MEASUREMENT OF pH

INTRODUCTION

An accurate pH measurement is critical for the prediction and interpretation of the reactions and migration of dissolved species. This procedure provides a useful pH measurement under most field conditions.

SCOPE

This method contains the procedures for the measurement of pH in an aqueous solution. The pH is determined using a glass hydrogen-ion electrode compared against a reference electrode of known potential by means of a pH meter.

SIGNIFICANCE AND USE

The pH of a solution is defined as the negative logarithm to the base 10 of the hydrogen-ion activity in moles per liter: $pH = -\log[H^+]$. Because pH is exponentially related to concentration, great care shall be taken in making the measurement.

Natural waters usually have pH values in the range of 4 to 9. The primary control over pH in natural waters is the carbonate system, including gaseous and dissolved carbon dioxide, bicarbonate, and carbonate ions.

Temperature, atmospheric contamination, and ionic strength are factors that affect pH measurements. The pH measurement is relatively free from interference from color, turbidity, colloidal matter, oxidants, or reductants.

APPARATUS

pH Meter - Numerous pH meters are available; the meter used should have a temperature compensating device, a slope adjustment, and be capable of reading pH to +/- 0.1 units
Flow Cell - for continuous flow measurements
Standard pH buffer solutions - 4, 7, 9 or 10
Combination pH electrode
Temperature-measuring device - capable of reading temperatures to +/- 0.1°C
Distilled water in a squeeze wash bottle
Lint-free tissue
Disposable beakers, test tubes, or centrifuge tubes

CALIBRATION

In each case, samplers will follow the manufacturer's instructions for the pH meter and electrode used. Electrodes shall be kept wet when not in use. Recommended solutions for storage are the pH 4.00 or pH 7.00 buffer.

Before use, remove electrode from the storage solution, rinse with distilled water, and blot dry with a lint-free tissue.

Adjust buffer solution and electrode to +/- 10°C of the sample temperature. This can be done by storing the buffer solutions and electrode in an ice chest or by letting sample water run over the buffer bottles and electrode until the temperatures have equilibrated.

Place the electrode in the pH 7.00 buffer, adjust the temperature compensation control to the temperature of the buffer, and adjust the calibration control to read the pH of the buffer. The pH of the buffer is equal to 7.00 only at 25°C; therefore, it is necessary to use the temperature-correction curve supplied by the manufacturer of the buffer.

Remove the electrode from the 7.00 buffer, rinse with distilled water, and blot dry. Place the electrode in either the pH 4.00 or the pH 10.00 buffer, bracketing the expected pH of the sample. Allow the reading to stabilize before making adjustments. Adjust the slope control to read the correct pH, again consulting the temperature-correction curve supplied by the manufacturer.

Rinse electrode with distilled water and blot dry. Recheck the value of the pH 7.00 buffer. The value must be within +/- 0.02 pH of the correct value. If not, repeat the calibration.

MEASUREMENT PROCEDURE

1. Consult the instrument-specific operating manual for equipment setup and operational checks. Perform any pre-measurement checks and calibrations according to manufacturer's operating procedures.

2. Rinse the calibrated electrode with distilled water, blot dry, and immerse the electrode in the solution to be measured.

3. Use of a flow cell is recommended for making pH measurements; this reduces the interferences due to atmospheric contamination. If possible, in-situ measurements are best.

4. Allow the measurement to stabilize and record the reading.

5. Remove the electrode from the solution, rinse with distilled water, blot dry, and store in pH 4.00 or pH 7.00 buffer solution.

DOCUMENTATION

- Log the time of the last two-buffer calibration. This calibration should be performed a minimum of once each hour.
- Record the buffer temperature at time of calibration.
- Record sample temperature at time of measurement
- Measurement type (in-situ, open container, air-exclusion container)
- Source and expiration date of buffers used
- Instrument manufacturer and model number
- Name of person performing the measurement, date, and time

MEASUREMENT OF SPECIFIC CONDUCTANCE

INTRODUCTION

Specific conductance is a widely used indicator of water quality. It measures the ability of water to carry an electrical current under specific conditions. This ability depends on the presence of ions, their total concentration mobility, and temperature. Specific conductance is a simple indicator of change within a system and is used as an aid in evaluating whether a sample is representative of the water in the system.

SCOPE

This procedure describes the field measurement of the specific conductance of an aqueous sample. The specific conductance is measured using a conductance meter and a platinum or stainless steel electrode.

SIGNIFICANCE AND USE

The specific conductance or conductivity of a sample is defined as the conductance of the sample between opposite sides of a cube, 1 centimeter (cm) in each direction. Because it is impractical to build electrodes with these characteristics, electrodes are manufactured in various forms. A cell constant is determined by measuring a solution of known conductivity. Solutions of known conductivity are purchased or can be made from reagent-grade KCL. Samplers will consult operating instructions for the specific instrument used for the determination of the cell constant. This conductivity is expressed in micromhos per centimeter (μmhos/cm).

INTERFERENCES

Temperature, ionic strength, and the determination of the cell constant are features that affect the measurement of conductivity.

The conductivity of a solution increases with temperature at approximately 2 percent per degree C. Significant errors can result from inaccurate temperature measurements. If the conductivity meter does not have automatic temperature correction, the sampler can use the following formula to correct the conductivity reading for temperature.

$$K = \frac{EM}{1 + 0.0191(t-25)}$$

where

K = corrected conductivity in μmhos/cm,
EM = measured conductivity in μmhos/cm, and
t = temperature in °C

The conductivity of a solution is a function of the concentration and charge of the ions in solution and of the rate the ions move under the influence of an electrical potential. As the ionic strength increases, the rate the individual ions move decreases. Conductivity varies linearly with ionic strength for values below 1,000 μmhos/cm. As conductivity increases above 5,000 μmhos/cm, the line curves significantly; beyond 50,000 μmhos/cm, the conductivity is an unsatisfactory index of ionic concentration.

The cell constant will be checked and verified on a regular basis. A significant change in the cell constant indicates that the electrode needs cleaning or changing. Consult the instrument operating manual for procedures to check the cell constant.

APPARATUS

- Specific conductance meter - capable of measuring conductivity in the range of 0 to 100,000 μmhos/cm and temperatures in the range of -5°C to 50°C
- Conductivity check solutions (0.001N, 0.01N, and 0.1N KCL)
- Distilled or deionized water in a squeeze bottle
- Disposable beakers, test tubes, or centrifuge tubes
- Lint-free tissue

PROCEDURE

1. Rinse the conductivity cell and temperature probe with several volumes of sample water.

2. Immerse the probe and cell in the sample.

3. Allow the readings to stabilize and record the temperature and conductivity readings on the field log form.

4. Remove the probes from the solution, rinse with distilled water, blot dry, and store according to the manufacturer's procedures.

DOCUMENTATION

- Record the source and expiration date of standards used
- List instrument manufacturer and model number
- Record date and time of calibration check
- Record temperature and conductivity of standards used to check calibration
- Record sample temperature and conductivity readings
- List the name of the person performing the measurement(s)

FIELD MEASUREMENT OF TEMPERATURE

INTRODUCTION

Temperature readings are important for numerous applications. They are used in the measurement of Eh, pH, conductivity, and dissolved oxygen; and in saturation and stability studies. It is important to know the temperature of surface waters and groundwaters for the accurate geochemical evaluation of equilibrium thermodynamics. Temperature readings of +/- 1°C are necessary for the above applications.

SCOPE

This procedure gives general guidance and recommendations that will be considered when taking a temperature measurement. There are numerous instruments on the market that can provide adequate temperature measurements. Each instrument operating manual should be consulted for detailed procedures.

SIGNIFICANCE AND USE

Temperature is a basic physical property that is measured by the response of matter to heat. There are many devices that, once calibrated, are acceptable for taking temperature measurements. These devices include liquid in glass (mercury in glass), thermocouples, bimetallic, and electrical-resistance thermometers. At a minimum, the device should measure temperature to +/- 0.1°C readability.

APPARATUS

- Temperature measuring device
- Distilled or deionized water in a squeeze wash bottle
- Lint-free tissue

PROCEDURE

1. The temperature measuring device should be calibrated according to the instrument operating manual supplied by the manufacturer of the device.

2. Rinse the thermometer with distilled or deionized water and blot dry.

3. Immerse the thermometer in the sample.

4. Allow the reading to stabilize and record the temperature.

DOCUMENTATION

- Record the manufacturer and model of the instrument used.
- Record the temperature measurement of the sample.
- List the name of the person performing the measurement, time, and date.

STANDARD PRACTICE FOR THE SAMPLING OF LIQUIDS

INTRODUCTION

The type of sampling equipment used for sampling liquids at JPG will depend on the sample to be collected, which analytes the sample is being collected for, and the site-specific requirements such as depth to water, depth of well, etc. Because each sampling situation is unique, the equipment used and its application may have to be modified to ensure that a representative sample is collected and it physical and chemical integrity is maintained.

SCOPE

The procedures listed here are used to collect liquid samples. There are several methods that can be used to collect liquid samples. Some sampling situations use a combination of these methods. For example, a peristaltic pump could be used to collect the inorganic samples and a bailer used to collect the organic samples. The methods likely to used at JPG are:

- Sampling with a Peristaltic Pump
- Sampling with a Bladder Pump
- Sampling with a Bailer
- Sampling with a Submersible Pump
- Sampling by Container Immersion

SIGNIFICANCE AND USE

The usefulness and limitations for each of the first four sampling methods are described as follows:

Peristaltic Pump:

Advantage	Disadvantage
Flow rates are easily adjustable. Device has no contact with the sample. Device can be used in wells of any diameter. High flow rates are obtainable for well purging. Only the tubing requires cleaning (peristaltic pumps only).	Use is limited to situations where the liquid level is less than 25 feet below the surface. Drop in pressure of suction-lift mechanisms causes degasing of the sample and loss of volatiles. Choice of construction material is limited. Centrifugal pumps need to be primed, resulting in possible sample contamination. Severe aeration and turbulence occur with centrifugal pump.

Bladder Pump:

Advantage	Disadvantage
Pump is constructed of inert materials; most pumps are designed specifically to sample for low levels of contaminants. Driving gas does not contact the sample, thus minimizing sample aeration and gas stripping. Pump is portable, though accessory equipment may be cumbersome. Relatively high pumping rate allows well evacuation and collection of large sample volumes. Sample delivery rate can be controlled easily on some models. Most models are capable of pumping lifts in excess of 200 feet. Pump diameters are variable, depending on the application. Pump is easily disassembled for cleaning.	Deep sampling requires large volumes of gas and longer cycles, thus increasing operating time and expense and reducing portability. Check valves in some models are subject to failure in water with high solids content. Most available models are expensive. Minimum rate of sample discharge of some models may be higher than ideal for sampling of volatile compounds.

Bailer:

Advantage	Disadvantage
Virtually any material can be used for construction. Device is inexpensive. No external power source is required. Mechanism can be constructed in any size and shape. Device is easy to use and easily cleaned; requires little training for operation and little maintenance.	Sampling is labor-intensive and time-consuming. Aeration, degasing, and turbulence occur during sampling. Sampler is susceptible to exposure to any contaminants in the sample. Device does not provide a continuous supply of sample.

Submersible Pump:

Advantage	Disadvantage
High pumping rates are possible for well purging. Pump can be used at depths of more than 200 feet.	Sampler has little control of flow rates; not possible to adjust from a high rate for purging to a low rate for sampling. Severe aeration and degasing of sample occurs, thus volatilizing organics and other sensitive compounds. Pump has limited portability and requires a power source for operation. Pump is not easily disassembled for cleaning.

METHOD 1 - SAMPLING WITH PERISTALTIC PUMP

Apparatus

- Peristaltic-type pump
- Silicone, C-Flex, or Norprene tubing for the pump head
- Silicone, Teflon, polyethylene, or vinyl tubing for the suction line (placed in sample liquid)
- Generator or other source of electricity

Procedure

1. Place the suction line in the liquid to be sampled. If sampling a monitoring well, place the tubing just above the screened interval.

2. Connect the suction line to the pump.

3. Turn on the pump and adjust the flow rate so sample turbulence is at a minimum. Allow several liters to flow and recheck stability parameters (i.e., pH, conductivity, temperature).

4. Fill the necessary sample bottles by allowing the pump discharge to flow gently down the side of the bottle with minimal turbulence.

5. Label, preserve, and document the sample as required.

6. Remove the tubing from the liquid and clean and decontaminate equipment as required.

NOTE: Sampling organics using a peristaltic pump is not recommended. The suction lift action will strip volatiles and degas the sample. Also the tubing tends to absorb some organics and slowly releases them, contaminating subsequent samples.

METHOD 2 - BLADDER PUMP

Apparatus

- Bladder-type pump
- Air compressor
- Teflon, polyethylene, or vinyl tubing for the air and sample line

Procedure

1. Lower the pump gently to a position just above the screened interval.

2. Connect the air line to the pump controller.

3. Initiate pumping and allow several liters of water to be pumped prior to sample collection (recheck stability parameters of pH, conductivity, and temperature).

4. Fill the necessary sample bottles by allowing the pump discharge to flow gently down the side of the bottle with minimal disturbance.

5. Label, preserve, and document the sample as required.

6. Remove the pump from the well and clean and decontaminate as required.

METHOD 3 - SAMPLING WITH A BAILER

Apparatus

- Teflon or stainless steel bailer
- Teflon or stainless steel cable or line
- Bailer reel and tripod

Procedure

1. Attach a properly pre-cleaned bailer to the cable or line.

2. Lower the bailer slowly until it contacts the liquid.

3. Allow the bailer to sink until it reaches the screened interval of the well or the desired sampling depth.

4. Slowly raise the bailer to the surface.

5. Tip the bailer or use a bottom-emptying device and fill a container to recheck the stability parameters (pH, conductivity, and temperature).

6. Repeat the bailing procedure as many times as necessary to fill the required sample bottles.

7. Clean and decontaminate the bailer as required.

NOTE: A bottom-emptying device is recommended for the collection of volatile organic compounds using a bailer.

METHOD 4 - SAMPLING WITH A SUBMERSIBLE PUMP

Apparatus

- Submersible-type pump
- Discharge tubing of vinyl, polyethylene, or Teflon
- Power source of generator or batteries

Procedure

1. Set up the pump according to the operating manual.

2. Gently lower the pump to a position just above the screened interval.

3. Initiate pumping and allow several tubing volumes of liquid to be pumped prior to sample collection. Recheck stability parameters (pH, conductivity, and temperature).

4. Fill the necessary sample bottles by allowing the pump discharge to flow gently down the side of the bottle with minimal turbulence.

5. Label, preserve, and document the samples as required.

6. Remove the pump, clean and decontaminate as required.

NOTE: Considerable agitation results when using a submersible pump. Submersible pumps are not recommended for the collection of dissolved gases, organics, or oxidation/reduction sensitive samples. They also have a higher potential of sample contamination because of the construction material.

METHOD 5 - SAMPLING BY CONTAINER IMMERSION

Apparatus

- Sample Containers
- Disposable gloves (type(s) as specified in the Health and Safety Plan)
- Distilled water in a squeeze bottle
- Lint-free tissues

Procedure

1. After putting on the appropriate gloves, rinse the sample container three times with the liquid to be sampled.

2. Submerge the sample bottle below the liquid surface. If the liquid is flowing, point the bottle upstream.

3. Allow the container to fill to the desired volume.

4. Remove the container, cap, and rinse the container's outside surface with distilled water and dry with a clean tissue.

5. Label and preserve the sample as required.

NOTE: For samples collected for VOC analysis, fill the bottle with zero air space. After capping, turn the bottle over and check for bubbles. If present, the procedure must be repeated.

COLLECTION, FILTRATION AND PRESERVATION OF LIQUID SAMPLES

INTRODUCTION

Many factors should be considered during the sample-collection phase. These factors include bottle type, bottle size, preservative, whether the sample should be filtered, in what order the samples should be collected, etc. The procedures listed here are presented to cover the sampling requirements anticipated for JPG.

SCOPE

This procedure covers the collection, filtration, and preservation of liquid samples. Provided are general collection procedures, specific collection procedures for the collection of organics, procedures for sample filtration, and procedures for sample preservation.

SIGNIFICANCE AND USE

Table 1 (from Table H-1 of the USATHAMA QAP) lists many of the standard methods for sample preservation and bottles that may be required for sample collection. Improper bottling, filtration, or preservation may compromise the integrity of the sample.

APPARATUS

- Sample bottles
- Sample labels
- Preservative solutions (see Table 1)
- Dispensers for preservative solutions
- Coolers and ice for storing collected samples at 4°C
- In-line filter holders and filters of 0.45 micrometer pore size

GENERAL SAMPLE COLLECTION PROCEDURES

1. All samples will be collected as close to the source as possible.

2. Choose the appropriate bottles for the analytes needed (Table 1). Visually inspect the bottle for cleanliness, breaks, or missing parts prior to sampling.

3. Label the bottles as required under the Sampling Design Plan.

4. Collect the samples by allowing the liquid to flow gently down the side of the bottle with minimal turbulence. Unfiltered samples will be collected prior to filtered samples.

5. Unfiltered samples should be collected in the following order:

   - Volatile organics and total organic halides
   - Dissolved gases and total organic carbon
   - Large-volume samples for organic compounds
   - Sensitive inorganics (i.e., NO_2-, NH_4+, Fe(II))
   - Total metals

6. Filtered samples should be collected in the following order:

   - Alkalinity
   - Sensitive inorganics
   - Trace metals
   - Major cation/anions

7. Add preservatives as required.

8. Cap the bottle securely. Rinse the outside surface with distilled water and wipe dry with a clean lint-free tissue.

9. Store as required. Most samples require storage at 4°C immediately after collection. A cooler with ice will be used for field storage and transport.

Sampling Non-Volatile Organics

1. Samples for non-volatile organics are collected directly into the sampler container. The container will be cleaned to EPA standards or purchased from a supplier that has them pre-cleaned to EPA standards (i.e., I-CHEM). Do not filter samples for organics.

2. Choose the appropriate bottle for the analyte(s) requested.

3. Label the bottle as required by the Sampling Design Plan.

4. Add preservative to the bottle, if required.

5. Slowly fill the bottle by allowing the liquid to flow gently down the side of the bottle with minimal turbulence.

6. Cap the bottle securely.

7. Store as required at 4°C.

Sampling for Volatile Organics

1. When sampling for volatile organics, special care will be taken during collection of the sample to reduce the possibility of significant loss of volatile constituents. Volatile organics should be the first samples collected. They are collected in a 40-milliliter (mL) vial that has a Teflon-lined, silicone-septum lid.

2. Properly label the bottle.

3. Slowly fill the bottle to overflowing.

4. Hold the container level and place the septum Teflon-side down on the convex water meniscus and seal with the screw cap.

5. Test the seal by inverting the vial and lightly tapping. There are to be no bubbles entrapped in the sample. If bubbles are present, uncap the container, add additional sample, and reseal as stated above.

SAMPLE FILTRATION PROCEDURE

Samples requiring filtration will be collected after unfiltered samples. To maintain closed-system conditions, an in-line membrane filter is connected directly to the pump outlet. This allows the sample to be filtered prior to atmospheric contact, which could alter the sample. A filter pore size of 0.45 μm is used for sample filtration.

1. Connect the in-line filter directly to the pump outlet.

2. Start the pump and discard the first 100 mL of sample. This flushes the filter of any excess distilled water used for prior cleaning of the filter assembly.

3. Place the sample bottles directly under the filter outlet and fill to the desired volume.

4. Preserve the sample as required.

5. Stop the pump, disconnect and disassemble the filter.

6. Discard the used filter and clean all surfaces of the filter holder with distilled water and wipe dry with a clean lint-free tissue.

7. Place a new filter in the holder and reassemble.

SAMPLE PRESERVATION PROCEDURE

Samples are preserved by a variety of means to stabilize specific parameter so that the samples can be shipped to a laboratory for analysis. Preservatives are designed to retard

biological effects, retard hydrolysis, reduce sorption effects, and reduce volatility of constituents. Preservation methods are generally limited to pH control, chemical addition, refrigeration, and protection from light. The following guidelines will be considered during sample preservation.

Preservation of samples requires the use of a variety of strong acids and bases. Care should be taken in their storage and use. Review of the MSDS sheet should be made before use and the appropriate eye and skin protection should be in place prior to use (i.e., goggles and gloves).

1. Preserve sample as soon after collection as possible.

2. For acidified samples, check the pH of the sample prior to capping. If needed, add more acid until the proper pH is attained (i.e., < 2).

3. Samples requiring cooling should be placed in an ice chest with wet ice immediately after collection.

4. Record any preservatives used on the sample label and the resulting pH, if applicable.

APPENDIX B

USATHAMA-APPROVED SAMPLE CONTAINERS, PRESERVATION REQUIREMENTS, STORAGE METHODS, AND HOLDING TIMES FOR ENVIRONMENTAL SAMPLES

Table B-1. Containers, Preservation, Storage, and Holding Times[a]

Parameter	Container[b] Water	Container[b] Soil	Preservative[c,d] Water	Preservative[c,d] Soil	Maximum Holding Time for all Matrices[e]
INORGANIC TESTS					
Acidity	P	G	Cool, 4°C	Cool, 4°C	14 days
Alkalinity	P	G	Cool, 4°C	Cool, 4°C	14 days
Ammonia	P	G	Cool, 4°C H_2SO_4 to pH <2	Cool, 4°C	28 days
Asbestos	P	G	Cool, 4°C	Cool, 4°C	48 hours[f]
Bicarbonate	P	G	None Required	None Required	Analyze Immediately
Biochemical Oxygen Demand (BOD) and Carbonaceous BOD	P	G	Cool, 4°C	Cool, 4°C	48 hours
Bromide	P	G	None Required	None Required	28 days
Carbonate	P	G	None Required	None Required	Analyze Immediately
Chemical Oxygen Demand (COD)	P	G	Cool, 4°C H_2SO_4 to pH <2	Cool, 4°C	28 days
Chloride	P	G	None Required	None Required	28 days
Chlorine, Total Residual	P	N/A	None Required	N/A	Analyze Immediately
Color	P	N/A	Cool, 4°C	N/A	48 hours
Cyanide, Total and Amenable to Chlorination	P	G	Cool, 4°C NaOH to pH >12 0.6 g Ascorbic Acid[g]	Cool, 4°C	14 days[h]
Dissolved Oxygen					
Probe	G Bottle and Top	N/A	None Required	N/A	Analyze Immediately
Winkler	G Bottle and Top	N/A	Fix On Site Store in Dark	N/A	8 hours
Fluoride	P	G	None Required	None Required	28 days
Hardness	P	N/A	HNO_3 or H_2SO_4 to pH<2	N/A	6 months
Hydrazine	P	G	If not analyzed immediately, collect under acid. Add 90 ml of sample to 10 ml HCl.	Cool, 4°C	7 days
Iodide	P	G	Cool, 4°C	Cool, 4°C	24 hours
Iodine	P	G	None Required	None Required	Analyze Immediately
Kjeldahl and Organic Nitrogen	P	G	Cool, 4°C H_2SO_4 to pH <2	Cool, 4°C	28 days

Table B-1. (Cont'd.)

Parameter	Container[b] Water	Container[b] Soil	Preservative[c,d] Water	Preservative[c,d] Soil	Maximum Holding Time for all Matrices[e]
Metals[i]					
Chromium VI	P	G	Cool, 4°C	Cool, 4°C	24 hours
Mercury	P	G	HNO_3 to pH <2	Cool, 4°C	28 days
Others	P	G	HNO_3 to pH <2	Cool, 4°C	6 months
Nitrate	P	G	Cool, 4°C	Cool, 4°C	48 hours
Nitrate plus Nitrite	P	G	Cool, 4°C H_2SO_4 to pH <2	Cool, 4°C	28 days
Nitrite	P	G	Cool, 4°C	Cool, 4°C	48 hours
Oil and Grease	G	G	Cool, 4°C H_2SO_4 to pH <2	Cool, 4°C	28 days
Orthophosphate	P	G	Filter Immediately Cool, 4°C	Cool, 4°C	48 hours
pH	P	G	None Required	None Required	Analyze Immediately
Phenols	G	G	Cool, 4°C H_2SO_4 to pH <2	Cool, 4°C	28 days
Phosphorous, Elemental	G	G	Cool, 4°C	Cool, 4°C	48 hours
Phosphorous, Total	P,G	G	Cool, 4°C H_2SO_4 to pH <2	Cool, 4°C	28 days
Silica, Dissolved or Total	P	G	Cool, 4°C	Cool, 4°C	28 days
Residue					
Filterable	P	N/A	Cool, 4°C	N/A	7 days
Settleable	P	N/A	Cool, 4°C	N/A	48 hours
Nonfilterable (TSS)	P	N/A	Cool, 4°C	N/A	7 days
Total	P	N/A	Cool, 4°C	N/A	7 days
Volatile	P	N/A	Cool, 4°C	N/A	7 days
Specific Conductance	P	G	Cool, 4°C	Cool, 4°C	28 days
Sulfate	P	G	Cool, 4°C	Cool, 4°C	28 days
Sulfide	P	G	Cool, 4°C Add Zinc Acetate plus NaOH to pH >9	Cool, 4°C	7 days
Sulfite	P	G	None Required	None Required	Analyze Immediately
Surfactants	P	G	Cool, 4°C	Cool, 4°C	48 hours
Temperature	P	G	None Required	None Required	Analyze Immediately
Turbidity	P	N/A	Cool, 4°C	N/A	48 hours
ORGANIC TESTS[j]					
Acrolein and Acrylonitrile	S	S	Cool, 4°C 0.008% $Na_2S_2O_3$[g] Adjust pH to 4-5[k]	Cool, 4°C	14 days[k]

Table B-1. (Cont'd.)

Parameter	Container[b] Water	Container[b] Soil	Preservative[c,d] Water	Preservative[c,d] Soil	Maximum Holding Time for all Matrices[e]
Benzidines[l]	G	G	Cool, 4°C[m] 0.008% $Na_2S_2O_3$[g] pH 2-7	Cool, 4°C	7 days until extraction[n]
Chlorinated Hydrocarbons[l]	G	G	Cool, 4°C	Cool, 4°C	7 days until extraction 40 days after extraction
Haloethers[l]	G	G	Cool, 4°C 0.008% $Na_2S_2O_3$[g]	Cool, 4°C	7 days until extraction 40 days after extraction
Nitroaromatics and Isophorone[l]	G	G	Cool, 4°C Store in Dark	Cool, 4°C Store in Dark	7 days until extraction 40 days after extraction
Nitrosamines[l,o]	G	G	Cool, 4°C Store in Dark 0.008% $Na_2S_2O_3$[g]	Cool, 4°C Store in Dark	7 days until extraction 40 days after extraction
PCBs	G	G	Cool, 4°C	Cool, 4°C	7 days until extraction 40 days after extraction
Pesticides[l]	G	G	Cool, 4°C pH 5-9[p]	Cool, 4°C	7 days until extraction 40 days after extraction
Phenols[l]	G	G	Cool, 4°C 0.008% $Na_2S_2O_3$[g]	Cool, 4°C	7 days until extraction 40 days after extraction
Phthalate Esters[l]	G	G	Cool, 4°C	Cool, 4°C	7 days until extraction 40 days after extraction
Polynuclear Aromatic Hydrocarbons[l]	G	G	Cool, 4°C 0.008% $Na_2S_2O_3$[g] Store in Dark	Cool, 4°C Store in Dark	7 days until extraction 40 days after extraction
Purgeable Aromatic Hydrocarbons	S	S	Cool, 4°C 0.008% $Na_2S_2O_3$[g] HCl to pH<2[q]	Cool, 4°C	14 days[q]
Purgeable Halocarbons	S	S	Cool, 4°C 0.008% $Na_2S_2O_3$[g]	Cool, 4°C	14 days
TCDD[l]	G	G	Cool, 4°C 0.008% Na_2SO_3[g]	Cool, 4°C	7 days until extraction 40 days after extraction
Total Organic Carbon	G	G	Cool, 4°C[q] HCl or H_2SO_4 to pH <2	Cool, 4°C	28 days
Total Organic Halogen	G	G	Cool, 4°C 1 ml of 0.1 M sodium sulfite	Cool, 4°C	7 days

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Analytes not listed should be preserved at 4°C and held not longer than 7 days.

[a]Preservatives and holding times are from Federal Register, Vol. 49, No. 209, Friday, October 26, 1984, Page 43260 and Characterization of Hazardous Waste Sites: A Methods Manual -- Volume II, Sampling Methods, Second Edition, EPA-600/4-84-076. Container requirements are consistent with these references.

[b]P = Polyethylene
G = Amber Glass with Teflon-lined cap
S = Glass Vial with Teflon-lined septum cap

[c]Sample preservation should be performed immediately upon sample collection. For composite samples, each aliquot should be preserved at the time of collection. When use of an automatic sampler makes it impossible to preserve each aliquot, samples may be preserved by maintaining at 4°C until compositing and sample splitting is completed.

[d]When any sample is to be shipped by common carrier or sent through the U.S. Mail, it must comply with the Department of Transportation Hazardous Materials Regulations (49 CFR Part 172). The person offering such material for transportation is responsible for ensuring such compliance. For the preservation requirements in this table, the Office of Hazardous Materials, Materials Transportation Bureau, Department of Transportation, has determined that the Hazardous Materials Regulations do not apply to the following materials: Hydrochloric acid (HCl) in water solutions at concentrations of 0.04% by weight or less (pH about 1.96 or greater); Nitric acid (HNO_3) in water solutions at concentrations of 0.15% by weight or less (pH about 1.62 or greater); Sulfuric acid (H_2SO_4) in water solutions at concentrations of 0.35% by weight or less (pH about 1.15 or greater); and Sodium hydroxide (NaOH) in water solutions at concentrations of 0.080% by weight or less (pH about 12.3 or less).

[e]Samples should be analyzed as soon as possible after collection. The times listed are the maximum times that samples may be held before analysis and still be considered valid.

Some samples may not be stable for the maximum time period given in the table. A laboratory is obligated to hold the sample for a shorter time if knowledge exists to show this is necessary to maintain sample integrity.

[f]If samples cannot be filtered within 48 hours, add 1 ml of a 2.71% solution of mercuric chloride to inhibit bacterial growth.

[g]Should only be used in the presence of residual chlorine.

[h]Maximum holding time is 24 hours when sulfide is present. Optionally, all samples may be tested with lead acetate paper before pH adjustment in order to determine if sulfide is present. If sulfide is present, it can be removed by addition of cadmium nitrate powder until a negative spot test is obtained. The sample is filtered and then NaOH is added to pH 12.

[i]For dissolved metals, filter immediately on site before adding preservative.

[j]Guidance applies to samples to be analyzed by GC, LC, or GC/MS for specific compounds.

[k]The pH adjustment is not required if acrolein will not be measured. Samples for acrolein receiving no pH adjustment must be analyzed within three days of sampling.

[l]When the extractable analytes of concern fall within a single chemical category, the specified preservative and maximum holding times must be observed for optimum safeguard of sample integrity. When the analytes of concern fall within two or more chemical categories, the sample may be preserved by cooling to 4°C, reducing residual chlorine with 0.008% sodium thiosulfate, storing in the dark, and adjusting pH to 6-9; samples preserved in this manner may be held for 7 days before extraction and 40 days after extraction. Exceptions to this optimal preservation and holding time procedure are noted in footnotes g, m, and n.

[m]If 1,2-diphenylhydrazine is likely to be present, adjust the pH of the sample to 4.0 $\pm$ 0.2 to prevent rearrangement to benzidine.

[n]Extracts may be stored up to 7 days before analysis if storage is conducted under an inert (oxidant-free) atmosphere.

[o]For the analysis of diphenylnitrosamine, add 0.008% $Na_2S_2O_3$ and adjust pH to 7-10 with NaOH within 24 hours of sampling.

[p]The pH adjustment may be performed upon receipt at the laboratory and may be omitted if the samples are extracted within 72 hours of collection. For the analysis of aldrin, add 0.008% $Na_2S_2O_3$.

[q]Sample receiving no pH adjustment must be analyzed within 7 days of sampling.

APPENDIX C

REPORTING LIMITS FOR LABORATORY ANALYSIS OF JPG ENVIRONMENTAL SAMPLES

2.0 USATHAMA Certified Methods and Acceptability

Arthur D. Little currently holds USATHAMA certification for over 50 methods. Table 1 provides a complete summary of these methods.

Please note that Table 1 also includes methods which are available but which are not currently certified. The certifications for many of these methods are in progress. Arthur D. Little is continually upgrading the certification status of methods to attain the highest level of USATHAMA acceptance as possible.

TABLE 1. Summary of ADL USATHAMA Program Methods

16-May-91

Analyte	USATHAMA Method	Analysis	Matrix	Units	Cert. Level	Date Certified	Certified Reporting Limit	Criterion of Detection	Maximum Conc.	Method Accuracy
HG	JB03	METALS/SOIL/CVAA	SO	UGG	C1	02-Jun-87	0.0259	0.01295	0.5	.992
CU	JC01	METALS/SOIL/AA	SO	UGG	C1	10-Apr-87	1.84	0.92	25	.970
FE	JC01	METALS/SOIL/AA	SO	UGG	C1	10-Apr-87	15	7.5	200	.858
MG	JC01	METALS/SOIL/AA	SO	UGG	C1	10-Apr-87	188	94	2000	.804
AG	JC06	METALS/SOIL/AA	SO	UGG	C1	18-Jan-89	1.75	0.875	25	.984
CO	JC06	METALS/SOIL/AA	SO	UGG	C1	18-Jan-89	8.09	4.045	250	1.02
CR	JC06	METALS/SOIL/AA	SO	UGG	C1	18-Jan-89	6.26	3.13	25	1.10
CU	JC06	METALS/SOIL/AA	SO	UGG	C1	18-Jan-89	1.11	0.555	10	1.07
FE	JC06	METALS/SOIL/AA	SO	UGG	C1	18-Jan-89	9.24	4.62	25	1.02
MG	JC06	METALS/SOIL/AA	SO	UGG	C1	18-Jan-89	4.99	2.495	50	.992
AS	JD05	METALS/SOIL/GFAA	SO	UGG	C1	02-Jun-87	4.67	2.335	49.4	.767
AS	JD13	METALS/SOIL/GFAA	SO	UGG	C1	25-Jan-89	0.219	0.1095	2	.986
AS	JE04	METALS/SOIL/HYAA	SO	UGG	C1	20-Jan-89	0.339	0.1695	2	1.08
SE	JE04	METALS/SOIL/HYAA	SO	UGG	C1	20-Jan-89	0.406	0.203	4	.836
AG	JS10	METALS/SOIL/ICP SEQ	SO	UGG	C1	18-Jan-89	3.06	1.53	50	1.04
AL	JS10	METALS/SOIL/ICP SEQ	SO	UGG	C1	18-Jan-89	7.83	3.915	225	1.16
B	JS10	METALS/SOIL/ICP SEQ	SO	UGG	C1	18-Jan-89	13	6.5	1000	1.00
BA	JS10	METALS/SOIL/ICP SEQ	SO	UGG	C1	18-Jan-89	0.134	0.067	100	.961
BE	JS10	METALS/SOIL/ICP SEQ	SO	UGG	C1	18-Jan-89	0.0667	0.03335	10	.952
BI	JS10	METALS/SOIL/ICP SEQ	SO	UGG	C1	18-Jan-89	4.93	2.465	1000	.936
CA	JS10	METALS/SOIL/ICP SEQ	SO	UGG	C1	18-Jan-89	10.1	5.05	100	.803
CD	JS10	METALS/SOIL/ICP SEQ	SO	UGG	C1	18-Jan-89	2.02	1.01	12.5	.863
CO	JS10	METALS/SOIL/ICP SEQ	SO	UGG	C1	18-Jan-89	2.4	1.2	1000	.934
CR	JS10	METALS/SOIL/ICP SEQ	SO	UGG	C1	18-Jan-89	2.92	1.46	100	.884

Analyte	USATHAMA Method	Analysis	Matrix	Units	Cert. Level	Date Certified	Certified Reporting Limit	Criterion of Detection	Maximum Conc.	Method Accuracy
CU	JS10	METALS/SOIL/ICP SEQ	SO	UGG	C1	18-Jan-89	2.59	1.295	20	.905
FE	JS10	METALS/SOIL/ICP SEQ	SO	UGG	C1	18-Jan-89	1.05	0.525	250	1.01
MG	JS10	METALS/SOIL/ICP SEQ	SO	UGG	C1	18-Jan-89	8.5	4.25	1250	.944
MN	JS10	METALS/SOIL/ICP SEQ	SO	UGG	C1	18-Jan-89	0.628	0.314	100	.985
MO	JS10	METALS/SOIL/ICP SEQ	SO	UGG	C1	18-Jan-89	1.24	0.62	160	1.01
NA	JS10	METALS/SOIL/ICP SEQ	SO	UGG	C1	18-Jan-89	40.2	20.1	580	.964
NI	JS10	METALS/SOIL/ICP SEQ	SO	UGG	C1	18-Jan-89	1.16	0.58	150	.971
SB	JS10	METALS/SOIL/ICP SEQ	SO	UGG	C1	18-Jan-89	4.34	2.17	300	.950
SE	JS10	METALS/SOIL/ICP SEQ	SO	UGG	C1	18-Jan-89	8.58	4.29	1500	.978
TE	JS10	METALS/SOIL/ICP SEQ	SO	UGG	C1	18-Jan-89	16.2	8.1	100	.934
TL	JS10	METALS/SOIL/ICP SEQ	SO	UGG	C1	18-Jan-89	2.82	1.41	800	1.06
V	JS10	METALS/SOIL/ICP SEQ	SO	UGG	C1	18-Jan-89	4.68	2.34	80	.944
ZN	JS10	METALS/SOIL/ICP SEQ	SO	UGG	C1	18-Jan-89	3.75	1.875	40	1.04
AL	JS15	METALS/SOIL/ICP SIM	SO	UGG	C1	09-May-91	15	7.5	450	.839
AS	JS15	METALS/SOIL/ICP SIM	SO	UGG	C1	09-May-91	24	12	300	.913
B	JS15	METALS/SOIL/ICP SIM	SO	UGG	C1	09-May-91	7.4	3.7	100	.854
BA	JS15	METALS/SOIL/ICP SIM	SO	UGG	C1	09-May-91	2.27	1.14	10	.868
BE	JS15	METALS/SOIL/ICP SIM	SO	UGG	C1	09-May-91	0.078	0.039	2.5	.874
CA	JS15	METALS/SOIL/ICP SIM	SO	UGG	C1	09-May-91	12.8	6.4	100	.840
CD	JS15	METALS/SOIL/ICP SIM	SO	UGG	C1	09-May-91	0.424	0.212	12.5	.850
CO	JS15	METALS/SOIL/ICP SIM	SO	UGG	C1	09-May-91	1.42	0.71	50	.905
CR	JS15	METALS/SOIL/ICP SIM	SO	UGG	C1	09-May-91	3.9	1.95	50	.923
CU	JS15	METALS/SOIL/ICP SIM	SO	UGG	C1	09-May-91	1.95	0.98	20	.915
FE	JS15	METALS/SOIL/ICP SIM	SO	UGG	C1	09-May-91	1.89	0.945	20	.919
MG	JS15	METALS/SOIL/ICP SIM	SO	UGG	C1	09-May-91	3.29	1.65	250	.823
MN	JS15	METALS/SOIL/ICP SIM	SO	UGG	C1	09-May-91	0.839	0.4195	20	.890
MO	JS15	METALS/SOIL/ICP SIM	SO	UGG	C1	09-May-91	1.49	0.745	40	.860
NI	JS15	METALS/SOIL/ICP SIM	SO	UGG	C1	09-May-91	2.46	1.23	30	.818
SE	JS15	METALS/SOIL/ICP SIM	SO	UGG	C1	09-May-91	50.7	25.35	750	.864
TE	JS15	METALS/SOIL/ICP SIM	SO	UGG	C1	09-May-91	5.48	2.74	50	.820

Analyte	USATHAMA Method	Analysis	Matrix	Units	Cert. Level	Date Certified	Certified Reporting Limit	Criterion of Detection	Maximum Conc.	Method Accuracy
TL	JS15	METALS/SOIL/ICP SIM	SO	UGG	C1	09-May-91	16.6	8.3	400	.842
V	JS15	METALS/SOIL/ICP SIM	SO	UGG	C1	09-May-91	1.34	0.67	40	.879
ZN	JS15	METALS/SOIL/ICP SIM	SO	UGG	C1	09-May-91	7.96	3.98	20	.874
CRHEX	JY04	HEXCR/SOIL/SPEC	SO	UGG	C1	11-Jul-90	10	5	500	.913
P4	KF16	INORGANIC/SOIL/TECHNICON	SO	UGG	C1	30-May-90	0.671	0.3355	70	1.00
CL	KT02	ANIONS/SOIL/IONCHROM	SO	UGG	C1	10-Apr-87	4.42	2.21	55.4	.882
F	KT02	ANIONS/SOIL/IONCHROM	SO	UGG	C1	10-Apr-87	3.51	1.755	19.6	.503
SO4	KT02	ANIONS/SOIL/IONCHROM	SO	UGG	C1	10-Apr-87	9.17	4.585	102	.906
BR	KT04	ANIONS/SOIL/IONCHROM	SO	UGG	C1	03-Feb-89	8.83	4.415	100	.912
CL	KT04	ANIONS/SOIL/IONCHROM	SO	UGG	C1	03-Feb-89	39.6	19.8	200	.964
F	KT04	ANIONS/SOIL/IONCHROM	SO	UGG	C1	03-Feb-89	19.2	9.6	200	.911
NO2	KT04	ANIONS/SOIL/IONCHROM	SO	UGG	C1	03-Feb-89	3.16	1.58	100	1.03
NO3	KT04	ANIONS/SOIL/IONCHROM	SO	UGG	C1	03-Feb-89	3.36	1.68	20	.926
SO4	KT04	ANIONS/SOIL/IONCHROM	SO	UGG	C1	03-Feb-89	14.4	7.2	500	.933
CYN	KY02	CYANIDE/SOIL/SPECTROPHOTO	SO	UGG	C1	14-Jun-87	5	2.5	100	.900
CYN	KY07	INORGANIC/SOIL/SPECT	SO	UGG	C1	22-Jun-90	5	2.5	100	.946
111TCE	LG05	HALOCARBONS/SOIL/GCELCD	SO	UGG	C1	04-Jan-89	0.0112	0.0056	0.204	1.06
112TCE	LG05	HALOCARBONS/SOIL/GCELCD	SO	UGG	C1	04-Jan-89	0.00576	0.00288	0.2	.889
11DCE	LG05	HALOCARBONS/SOIL/GCELCD	SO	UGG	C1	04-Jan-89	0.0195	0.00975	0.396	.906
11DCLE	LG05	HALOCARBONS/SOIL/GCELCD	SO	UGG	C1	04-Jan-89	0.00853	0.004265	0.198	.895
12DCE	LG05	HALOCARBONS/SOIL/GCELCD	SO	UGG	C1	04-Jan-89	0.0123	0.00615	0.402	.906
12DCLB	LG05	HALOCARBONS/SOIL/GCELCD	SO	UGG	C1	04-Jan-89	0.0187	0.00935	0.397	.869
12DCLE	LG05	HALOCARBONS/SOIL/GCELCD	SO	UGG	C1	04-Jan-89	0.00745	0.003725	0.2	.997
12DCLP	LG05	HALOCARBONS/SOIL/GCELCD	SO	UGG	C1	04-Jan-89	0.00556	0.00278	0.204	.964

Analyte	USATHAMA Method	Analysis	Matrix	Units	Cert. Level	Date Certified	Certified Reporting Limit	Criterion of Detection	Maximum Conc.	Method Accuracy
13DCLB	LG05	HALOCARBONS/SOIL/GCELCD	SO	UGG	C1	04-Jan-89	0.0281	0.01405	0.402	.829
14DCLB	LG05	HALOCARBONS/SOIL/GCELCD	SO	UGG	C1	04-Jan-89	0.0206	0.0103	0.397	.906
BDRCLM	LG05	HALOCARBONS/SOIL/GCELCD	SO	UGG	C1	04-Jan-89	0.0213	0.01065	0.4	.866
C13DCP	LG05	HALOCARBONS/SOIL/GCELCD	SO	UGG	C1	04-Jan-89	0.0171	0.00855	0.4	.922
C2H3CL	LG05	HALOCARBONS/SOIL/GCELCD	SO	UGG	C1	04-Jan-89	0.0469	0.02345	1	1.14
C2H5CL	LG05	HALOCARBONS/SOIL/GCELCD	SO	UGG	C1	04-Jan-89	0.0487	0.02435	1.01	1.03
CCL4	LG05	HALOCARBONS/SOIL/GCELCD	SO	UGG	C1	04-Jan-89	0.0128	0.0064	0.204	1.06
CH2CL2	LG05	HALOCARBONS/SOIL/GCELCD	SO	UGG	C1	04-Jan-89	0.122	0.061	1.59	.923
CH3CL	LG05	HALOCARBONS/SOIL/GCELCD	SO	UGG	C1	04-Jan-89	0.0373	0.01865	0.8	1.05
CHBR3	LG05	HALOCARBONS/SOIL/GCELCD	SO	UGG	C1	04-Jan-89	0.0945	0.04725	0.81	1.03
CHCL3	LG05	HALOCARBONS/SOIL/GCELCD	SO	UGG	C1	04-Jan-89	0.0143	0.00715	0.202	.853
CLC6H5	LG05	HALOCARBONS/SOIL/GCELCD	SO	UGG	C1	04-Jan-89	0.0254	0.0127	0.398	.895
DBRCLM	LG05	HALOCARBONS/SOIL/GCELCD	SO	UGG	C1	04-Jan-89	0.0385	0.01925	0.4	.981
T13DCP	LG05	HALOCARBONS/SOIL/GCELCD	SO	UGG	C1	04-Jan-89	0.019	0.0095	0.4	.972
TCLEA	LG05	HALOCARBONS/SOIL/GCELCD	SO	UGG	C1	04-Jan-89	0.0065	0.00325	0.204	1.00
TCLEE	LG05	HALOCARBONS/SOIL/GCELCD	SO	UGG	C1	04-Jan-89	0.00783	0.003915	0.1	.952
TRCLE	LG05	HALOCARBONS/SOIL/GCELCD	SO	UGG	C1	04-Jan-89	0.0208	0.0104	0.199	.861
ALDRN	LH03	PESTICIDES/SOIL/GCECD	SO	UGG	1B	10-Apr-87	0.05	0.025	1.01	.963
DLDRN	LH03	PESTICIDES/SOIL/GCECD	SO	UGG	1B	10-Apr-87	0.726	0.363	10.1	1.05
ENDRN	LH03	PESTICIDES/SOIL/GCECD	SO	UGG	1B	10-Apr-87	0.5	0.25	10	1.05
ISODR	LH03	PESTICIDES/SOIL/GCECD	SO	UGG	1B	10-Apr-87	0.082	0.041	1	.975
ABHC	LH13	PESTICIDES/SOIL/GCECD	SO	UGG	1B	04-Jan-89	0.00505	0.002525	0.05	.737
ACLDAN	LH13	PESTICIDES/SOIL/GCECD	SO	UGG	1B	04-Jan-89	0.00184	0.00092	0.05	.537
ALDRN	LH13	PESTICIDES/SOIL/GCECD	SO	UGG	1B	04-Jan-89	0.00807	0.004035	0.1	.669
DBHC	LH13	PESTICIDES/SOIL/GCECD	SO	UGG	1B	04-Jan-89	0.0049	0.00245	0.1	.880
DLDRN	LH13	PESTICIDES/SOIL/GCECD	SO	UGG	1B	04-Jan-89	0.00519	0.002595	0.05	.917
ENDRN	LH13	PESTICIDES/SOIL/GCECD	SO	UGG	1B	04-Jan-89	0.00754	0.00377	0.1	1.04
GCLDAN	LH13	PESTICIDES/SOIL/GCECD	SO	UGG	1B	04-Jan-89	0.0038	0.0019	0.05	.519
HPCL	LH13	PESTICIDES/SOIL/GCECD	SO	UGG	1B	04-Jan-89	0.00115	0.000575	0.01	.921

Analyte	USATHAMA Method	Analysis	Matrix	Units	Cert. Level	Date Certified	Certified Reporting Limit	Criterion of Detection	Maximum Conc.	Method Accuracy
HPCLE	LH13	PESTICIDES/SOIL/GCECD	SO	UGG	1B	04-Jan-89	0.00355	0.001775	0.1	.598
ISODR	LH13	PESTICIDES/SOIL/GCECD	SO	UGG	1B	04-Jan-89	0.00793	0.003965	0.1	.623
LIN	LH13	PESTICIDES/SOIL/GCECD	SO	UGG	1B	04-Jan-89	0.00465	0.002325	0.025	.467
PCB016	LH13	PESTICIDES/SOIL/GCECD	SO	UGG	1B	04-Jan-89	0.0704	0.0352	0.5	.726
PCB260	LH13	PESTICIDES/SOIL/GCECD	SO	UGG	1B	04-Jan-89	0.0538	0.0269	0.5	.649
PPDDD	LH13	PESTICIDES/SOIL/GCECD	SO	UGG	1B	04-Jan-89	0.0101	0.00505	0.1	.932
PPDDE	LH13	PESTICIDES/SOIL/GCECD	SO	UGG	1B	04-Jan-89	0.00399	0.001995	0.1	.874
24DCLP	LJ04	PHENOLS/SOIL/GCFID	SO	UGG	C1	09-Jan-89	0.0652	0.0326	0.613	.624
24DMPN	LJ04	PHENOLS/SOIL/GCFID	SO	UGG	C1	09-Jan-89	0.164	0.082	0.467	.125
2CLP	LJ04	PHENOLS/SOIL/GCFID	SO	UGG	C1	09-Jan-89	0.0248	0.0124	0.461	.589
2NP	LJ04	PHENOLS/SOIL/GCFID	SO	UGG	C1	09-Jan-89	0.15	0.075	0.789	.510
46DN2C	LJ04	PHENOLS/SOIL/GCFID	SO	UGG	C1	09-Jan-89	3.53	1.765	22.7	.462
4CL3C	LJ04	PHENOLS/SOIL/GCFID	SO	UGG	C1	09-Jan-89	0.0393	0.01965	0.622	.588
4NP	LJ04	PHENOLS/SOIL/GCFID	SO	UGG	C1	09-Jan-89	0.723	0.3615	4.54	.337
CL3P	LJ04	PHENOLS/SOIL/GCFID	SO	UGG	C1	09-Jan-89	0.0388	0.0194	0.752	.679
PCP	LJ04	PHENOLS/SOIL/GCFID	SO	UGG	C1	09-Jan-89	1.36	0.68	10.5	.555
PHENOL	LJ04	PHENOLS/SOIL/GCFID	SO	UGG	C1	09-Jan-89	0.0173	0.00865	0.167	.484
DIMP	LK01	ORGANOPHOSPHOR/SOIL/GCFPD	SO	UGG	1B	10-Apr-87	1.97	0.985	9.84	.859
DMMP	LK01	ORGANOPHOSPHOR/SOIL/GCFPD	SO	UGG	1B	10-Apr-87	1.34	0.67	10.1	.871
CPMSO	LL01	ORGANOSULFURS/SOIL/GCFPD	SO	UGG	C1	29-May-87	18.2	9.1	80	.485
CPMSO2	LL01	ORGANOSULFURS/SOIL/GCFPD	SO	UGG	C1	29-May-87	6.24	3.12	80	.730
DITH	LL01	ORGANOSULFURS/SOIL/GCFPD	SO	UGG	C1	29-May-87	1.88	0.94	20	.862
BTZ	LL02	ORGANOSULFURS/SOIL/GCFPD	SO	UGG	C1	25-Jul-88	2.76	1.38	25	.752
CPMS	LL02	ORGANOSULFURS/SOIL/GCFPD	SO	UGG	C1	25-Jul-88	3.96	1.98	25.1	.816
CPMSO	LL02	ORGANOSULFURS/SOIL/GCFPD	SO	UGG	C1	25-Jul-88	4.48	2.24	25.1	.872
CPMSO2	LL02	ORGANOSULFURS/SOIL/GCFPD	SO	UGG	C1	25-Jul-88	5.13	2.565	25	.802
DITH	LL02	ORGANOSULFURS/SOIL/GCFPD	SO	UGG	C1	25-Jul-88	0.588	0.294	11.8	.759

Analyte	USATHAMA Method	Analysis	Matrix	Units	Cert. Level	Date Certified	Certified Reporting Limit	Criterion of Detection	Maximum Conc.	Method Accuracy
OXAT	LL02	ORGANOSULFURS/SOIL/GCFPD	SO	UGG	C1	25-Jul-88	1.91	0.955	26.4	.650
TDGCL	LL02	ORGANOSULFURS/SOIL/GCFPD	SO	UGG	C1	25-Jul-88	4.18	2.09	25	.788
123TCB	LM15	SV ORGANICS/SOIL/GCMS	SO	UGG	1A	15-Mar-88	0.29	0.145	3.3	.702
124TCB	LM15	SV ORGANICS/SOIL/GCMS	SO	UGG	1A	15-Mar-88	0.29	0.145	3.3	.706
12DCLB	LM15	SV ORGANICS/SOIL/GCMS	SO	UGG	1A	15-Mar-88	0.33	0.165	3.3	.684
13DBD4	LM15	SV ORGANICS/SOIL/GCMS	SO	UGG	1A	15-Mar-88	0.26	0.13	3.3	.765
13DCLB	LM15	SV ORGANICS/SOIL/GCMS	SO	UGG	1A	15-Mar-88	0.33	0.165	3.3	.651
14DCLB	LM15	SV ORGANICS/SOIL/GCMS	SO	UGG	1A	15-Mar-88	0.32	0.16	3.3	.660
24DNT	LM15	SV ORGANICS/SOIL/GCMS	SO	UGG	1A	15-Mar-88	0.39	0.195	6.7	.818
26DNT	LM15	SV ORGANICS/SOIL/GCMS	SO	UGG	1A	15-Mar-88	0.53	0.265	6.7	.763
2CNAP	LM15	SV ORGANICS/SOIL/GCMS	SO	UGG	1A	15-Mar-88	0.32	0.16	3.3	.686
ABHC	LM15	SV ORGANICS/SOIL/GCMS	SO	UGG	1A	15-Mar-88	0.46	0.23	6.7	.650
ALDRN	LM15	SV ORGANICS/SOIL/GCMS	SO	UGG	1A	15-Mar-88	0.29	0.145	3.3	.695
ANAPNE	LM15	SV ORGANICS/SOIL/GCMS	SO	UGG	1A	15-Mar-88	0.41	0.205	3.3	.667
ANAPYL	LM15	SV ORGANICS/SOIL/GCMS	SO	UGG	1A	15-Mar-88	0.46	0.23	3.3	.637
ANTRC	LM15	SV ORGANICS/SOIL/GCMS	SO	UGG	1A	15-Mar-88	0.54	0.27	3.3	.599
B2CLEE	LM15	SV ORGANICS/SOIL/GCMS	SO	UGG	1A	15-Mar-88	0.33	0.165	3.3	.754
B2EHP	LM15	SV ORGANICS/SOIL/GCMS	SO	UGG	1A	15-Mar-88	0.39	0.195	3.3	.697
BAANTR	LM15	SV ORGANICS/SOIL/GCMS	SO	UGG	1A	15-Mar-88	0.3	0.15	3.3	.689
BAPYR	LM15	SV ORGANICS/SOIL/GCMS	SO	UGG	1A	15-Mar-88	0.38	0.19	3.3	.594
BBFANT	LM15	SV ORGANICS/SOIL/GCMS	SO	UGG	1A	15-Mar-88	0.36	0.18	6.7	.704
BBHC	LM15	SV ORGANICS/SOIL/GCMS	SO	UGG	1A	15-Mar-88	0.36	0.18	6.7	.957
BGHIPY	LM15	SV ORGANICS/SOIL/GCMS	SO	UGG	1A	15-Mar-88	0.24	0.12	3.3	.797
BKFANT	LM15	SV ORGANICS/SOIL/GCMS	SO	UGG	1A	15-Mar-88	0.8	0.4	3.3	.460
CHRY	LM15	SV ORGANICS/SOIL/GCMS	SO	UGG	1A	15-Mar-88	0.45	0.225	3.3	.640
CL6BZ	LM15	SV ORGANICS/SOIL/GCMS	SO	UGG	1A	15-Mar-88	0.26	0.13	6.7	.612
CL6ET	LM15	SV ORGANICS/SOIL/GCMS	SO	UGG	1A	15-Mar-88	0.4	0.2	3.3	.690
CPMS	LM15	SV ORGANICS/SOIL/GCMS	SO	UGG	1A	15-Mar-88	0.37	0.185	3.3	.701
CPMSO	LM15	SV ORGANICS/SOIL/GCMS	SO	UGG	1A	15-Mar-88	0.27	0.135	6.7	.829
CPMSO2	LM15	SV ORGANICS/SOIL/GCMS	SO	UGG	1A	15-Mar-88	0.69	0.345	3.3	.778

Analyte	USATHAMA Method	Analysis	Matrix	Units	Cert. Level	Date Certified	Certified Reporting Limit	Criterion of Detection	Maximum Conc.	Method Accuracy
DBAHA	LM15	SV ORGANICS/SOIL/GCMS	SO	UGG	1A	15-Mar-88	0.2	0.1	3.3	.976
DBHC	LM15	SV ORGANICS/SOIL/GCMS	SO	UGG	1A	15-Mar-88	0.29	0.145	3.3	.881
DEPD4	LM15	SV ORGANICS/SOIL/GCMS	SO	UGG	1A	15-Mar-88	0.48	0.24	3.3	.787
DITH	LM15	SV ORGANICS/SOIL/GCMS	SO	UGG	1A	15-Mar-88	0.24	0.12	3.3	.618
DLDRN	LM15	SV ORGANICS/SOIL/GCMS	SO	UGG	1A	15-Mar-88	0.3	0.15	3.3	.726
DNOP	LM15	SV ORGANICS/SOIL/GCMS	SO	UGG	1A	15-Mar-88	0.59	0.295	3.3	.561
DNOPD4	LM15	SV ORGANICS/SOIL/GCMS	SO	UGG	1A	15-Mar-88	0.52	0.26	3.3	.758
ENDRN	LM15	SV ORGANICS/SOIL/GCMS	SO	UGG	1A	15-Mar-88	0.41	0.205	6.7	.875
FANT	LM15	SV ORGANICS/SOIL/GCMS	SO	UGG	1A	15-Mar-88	0.52	0.26	3.3	.602
HCBD	LM15	SV ORGANICS/SOIL/GCMS	SO	UGG	1A	15-Mar-88	0.42	0.21	3.3	.705
HPCL	LM15	SV ORGANICS/SOIL/GCMS	SO	UGG	1A	15-Mar-88	0.28	0.14	3.3	.800
HPCLE	LM15	SV ORGANICS/SOIL/GCMS	SO	UGG	1A	15-Mar-88	0.36	0.18	6.7	.701
ICDPYR	LM15	SV ORGANICS/SOIL/GCMS	SO	UGG	1A	15-Mar-88	0.21	0.105	3.3	1.04
LIN	LM15	SV ORGANICS/SOIL/GCMS	SO	UGG	1A	15-Mar-88	0.43	0.215	6.7	.679
MLTHN	LM15	SV ORGANICS/SOIL/GCMS	SO	UGG	1A	15-Mar-88	0.48	0.24	6.7	.718
NAP	LM15	SV ORGANICS/SOIL/GCMS	SO	UGG	1A	15-Mar-88	0.42	0.21	3.3	.617
NBD5	LM15	SV ORGANICS/SOIL/GCMS	SO	UGG	1A	15-Mar-88	0.7	0.35	3.3	.715
NDNPA	LM15	SV ORGANICS/SOIL/GCMS	SO	UGG	1A	15-Mar-88	0.36	0.18	3.3	.777
OXAT	LM15	SV ORGANICS/SOIL/GCMS	SO	UGG	1A	15-Mar-88	0.25	0.125	6.7	.561
PHANTR	LM15	SV ORGANICS/SOIL/GCMS	SO	UGG	1A	15-Mar-88	0.41	0.205	3.3	.645
PPDDD	LM15	SV ORGANICS/SOIL/GCMS	SO	UGG	1A	15-Mar-88	0.18	0.09	3.3	.754
PPDDE	LM15	SV ORGANICS/SOIL/GCMS	SO	UGG	1A	15-Mar-88	0.22	0.11	3.3	.743
PPDDT	LM15	SV ORGANICS/SOIL/GCMS	SO	UGG	1A	15-Mar-88	0.41	0.205	3.3	.765
PRTHN	LM15	SV ORGANICS/SOIL/GCMS	SO	UGG	1A	15-Mar-88	0.46	0.23	6.7	.821
PYR	LM15	SV ORGANICS/SOIL/GCMS	SO	UGG	1A	15-Mar-88	0.42	0.21	3.3	.619
111TCE	LM16	VOLATILES/SOIL/GCMS	SO	UGG	1A	15-Mar-88	0.0042	0.0021	0.2	1.15
112TCE	LM16	VOLATILES/SOIL/GCMS	SO	UGG	1A	15-Mar-88	0.02	0.01	0.2	1.06
11DCE	LM16	VOLATILES/SOIL/GCMS	SO	UGG	1A	15-Mar-88	0.019	0.0095	0.2	1.18
11DCLE	LM16	VOLATILES/SOIL/GCMS	SO	UGG	1A	15-Mar-88	0.0017	0.00085	0.2	1.20
12DCD4	LM16	VOLATILES/SOIL/GCMS	SO	UGG	1A	15-Mar-88	0.0027	0.00135	0.2	1.09

Analyte	USATHAMA Method	Analysis	Matrix	Units	Cert. Level	Date Certified	Certified Reporting Limit	Criterion of Detection	Maximum Conc.	Method Accuracy
12DCE	LM16	VOLATILES/SOIL/GCMS	SO	UGG	1A	15-Mar-88	0.002	0.001	0.2	1.22
12DCLB	LM16	VOLATILES/SOIL/GCMS	SO	UGG	1A	15-Mar-88	0.0012	0.0006	0.2	.899
12DCLE	LM16	VOLATILES/SOIL/GCMS	SO	UGG	1A	15-Mar-88	0.0031	0.00155	0.2	1.08
12DCLP	LM16	VOLATILES/SOIL/GCMS	SO	UGG	1A	15-Mar-88	0.0022	0.0011	0.2	1.05
13DCLB	LM16	VOLATILES/SOIL/GCMS	SO	UGG	1A	15-Mar-88	0.002	0.001	0.2	.946
13DCP	LM16	VOLATILES/SOIL/GCMS	SO	UGG	1A	15-Mar-88	0.0013	0.00065	0.2	1.27
14DCLB	LM16	VOLATILES/SOIL/GCMS	SO	UGG	1A	15-Mar-88	0.0009	0.00045	0.2	.993
2CLEVE	LM16	VOLATILES/SOIL/GCMS	SO	UGG	1A	15-Mar-88	0.048	0.024	0.2	.577
BRDCLM	LM16	VOLATILES/SOIL/GCMS	SO	UGG	1A	15-Mar-88	0.0033	0.00165	0.2	.983
C2H3CL	LM16	VOLATILES/SOIL/GCMS	SO	UGG	1A	15-Mar-88	0.015	0.0075	0.2	1.64
C2H5CL	LM16	VOLATILES/SOIL/GCMS	SO	UGG	1A	15-Mar-88	0.027	0.0135	0.2	1.35
C6H6	LM16	VOLATILES/SOIL/GCMS	SO	UGG	1A	15-Mar-88	0.0029	0.00145	0.2	1.10
CCL4	LM16	VOLATILES/SOIL/GCMS	SO	UGG	1A	15-Mar-88	0.0056	0.0028	0.2	1.13
CD2CL2	LM16	VOLATILES/SOIL/GCMS	SO	UGG	1A	15-Mar-88	0.002	0.001	0.2	1.02
CH2CL2	LM16	VOLATILES/SOIL/GCMS	SO	UGG	1A	15-Mar-88	0.0057	0.00285	0.2	1.17
CH3CL	LM16	VOLATILES/SOIL/GCMS	SO	UGG	1A	15-Mar-88	0.017	0.0085	0.2	1.85
CHBR3	LM16	VOLATILES/SOIL/GCMS	SO	UGG	1A	15-Mar-88	0.018	0.009	0.2	.980
CHCL3	LM16	VOLATILES/SOIL/GCMS	SO	UGG	1A	15-Mar-88	0.0023	0.00115	0.2	1.10
CLC6H5	LM16	VOLATILES/SOIL/GCMS	SO	UGG	1A	15-Mar-88	0.0028	0.0014	0.2	1.02
DBRCLM	LM16	VOLATILES/SOIL/GCMS	SO	UGG	1A	15-Mar-88	0.014	0.007	0.2	.982
ETBD10	LM16	VOLATILES/SOIL/GCMS	SO	UGG	1A	15-Mar-88	0.0031	0.00155	0.2	1.02
ETC6H5	LM16	VOLATILES/SOIL/GCMS	SO	UGG	1A	15-Mar-88	0.0033	0.00165	0.2	1.02
MEC6D8	LM16	VOLATILES/SOIL/GCMS	SO	UGG	1A	15-Mar-88	0.0084	0.0042	0.05	1.42
MEC6H5	LM16	VOLATILES/SOIL/GCMS	SO	UGG	1A	15-Mar-88	0.0084	0.0042	0.2	1.28
TCLEA	LM16	VOLATILES/SOIL/GCMS	SO	UGG	1A	15-Mar-88	0.0016	0.0008	0.2	1.12
TCLEE	LM16	VOLATILES/SOIL/GCMS	SO	UGG	1A	15-Mar-88	0.0019	0.00095	0.2	1.33
TRCLE	LM16	VOLATILES/SOIL/GCMS	SO	UGG	1A	15-Mar-88	0.0038	0.0019	0.2	1.09
ATZ	LN03	NIT-PHOSPHOR/SOIL/GCNPD	SO	UGG	C1	18-Jan-89	0.315	0.1575	23.1	.715
DDVP	LN03	NIT-PHOSPHOR/SOIL/GCNPD	SO	UGG	C1	18-Jan-89	0.018	0.009	10	.522
MLTHN	LN03	NIT-PHOSPHOR/SOIL/GCNPD	SO	UGG	C1	18-Jan-89	0.314	0.157	10.1	.852

Analyte	USATHAMA Method	Analysis	Matrix	Units	Cert. Level	Date Certified	Certified Reporting Limit	Criterion of Detection	Maximum Conc.	Method Accuracy
PRTHN	LN03	NIT-PHOSPHOR/SOIL/GCNPD	SO	UGG	C1	18-Jan-89	0.263	0.1315	10	.859
SUPONA	LN03	NIT-PHOSPHOR/SOIL/GCNPD	SO	UGG	C1	18-Jan-89	0.277	0.1385	22.6	.910
NDNPA	LN06	NIT-PHOSPHOR/SOIL/GCNPD	SO	UGG	C1	03-Apr-89	0.136	0.068	5	.577
NNDMEA	LN06	NIT-PHOSPHOR/SOIL/GCNPD	SO	UGG	C1	03-Apr-89	0.0569	0.02845	1.98	.308
NNDPA	LN06	NIT-PHOSPHOR/SOIL/GCNPD	SO	UGG	C1	03-Apr-89	0.197	0.0985	10	.733
12DCLB	LP03	AROMATICS/SOIL/GCPID	SO	UGG	C1	31-Oct-88	0.0281	0.01405	0.397	1.02
13DCLB	LP03	AROMATICS/SOIL/GCPID	SO	UGG	C1	31-Oct-88	0.0268	0.0134	0.402	1.05
14DCLB	LP03	AROMATICS/SOIL/GCPID	SO	UGG	C1	31-Oct-88	0.0383	0.01915	0.408	.993
C6H6	LP03	AROMATICS/SOIL/GCPID	SO	UGG	C1	31-Oct-88	0.0202	0.0101	0.398	.948
CLC6H5	LP03	AROMATICS/SOIL/GCPID	SO	UGG	C1	31-Oct-88	0.0208	0.0104	0.398	1.02
ETC6H5	LP03	AROMATICS/SOIL/GCPID	SO	UGG	C1	31-Oct-88	0.0335	0.01675	0.399	1.11
MEC6H5	LP03	AROMATICS/SOIL/GCPID	SO	UGG	C1	31-Oct-88	0.0247	0.01235	0.399	1.00
MXYLEN	LP03	AROMATICS/SOIL/GC-PID	SO	UGG	C1	06-Aug-90	0.00191	0.000955	0.5	1.02
OXYLEN	LP03	AROMATICS/SOIL/GC-PID	SO	UGG	C1	06-Aug-90	0.00729	0.003645	0.5	1.01
OXYLEN	LP03	AROMATICS/SOIL/GC-PID	SO	UGG	C1	06-Aug-90	0.00729	0.003645	0.5	1.01
135TNB	LW16	EXPLOSIVES/SOIL/HPLC	SO	UGG	C1	31-Oct-88	0.541	0.2705	4.99	.919
13DNB	LW16	EXPLOSIVES/SOIL/HPLC	SO	UGG	C1	31-Oct-88	0.145	0.0725	12.5	.921
246TNT	LW16	EXPLOSIVES/SOIL/HPLC	SO	UGG	C1	31-Oct-88	0.396	0.198	25	.892
135TNB	LW26	EXPLOSIVES/SOIL/HPLC	SO	UGG	C1	01-May-90	0.352	0.176	5.07	.929
13DNB	LW26	EXPLOSIVES/SOIL/HPLC	SO	UGG	C1	01-May-90	0.304	0.152	5.2	.939
246TNT	LW26	EXPLOSIVES/SOIL/HPLC	SO	UGG	C1	01-May-90	0.931	0.4655	9.94	.863
24DNT	LW26	EXPLOSIVES/SOIL/HPLC	SO	UGG	C1	01-May-90	0.744	0.372	10	.934
26DNT	LW26	EXPLOSIVES/SOIL/HPLC	SO	UGG	C1	01-May-90	0.83	0.415	10	.934
2NT	LW26	EXPLOSIVES/SOIL/HPLC	SO	UGG	C1	01-May-90	1.59	0.795	30.1	.893
HMX	LW26	EXPLOSIVES/SOIL/HPLC	SO	UGG	C1	01-May-90	0.755	0.3775	10	.900
NB	LW26	EXPLOSIVES/SOIL/HPLC	SO	UGG	C1	01-May-90	1.04	0.52	20.7	.989
RDX	LW26	EXPLOSIVES/SOIL/HPLC	SO	UGG	C1	01-May-90	0.445	0.2225	10	.869

Analyte	USATHAMA Method	Analysis	Matrix	Units	Cert. Level	Date Certified	Certified Reporting Limit	Criterion of Detection	Maximum Conc.	Method Accuracy
TETRYL	LW26	EXPLOSIVES/SOIL/HPLC	SO	UGG	C1	01-May-90	1.04	0.52	10	.908
245T	LW29	HERBICIDES/SOIL/HPLC	SO	UGG	C1	14-Dec-90	1.08	0.54	14.6	.765
245TP	LW29	HERBICIDES/SOIL/HPLC	SO	UGG	C1	14-Dec-90	1.15	0.575	28.8	.836
24D	LW29	HERBICIDES/SOIL/HPLC	SO	UGG	C1	14-Dec-90	0.854	0.427	14.5	.703
HG	SB03	METALS/WATER/CVAA	WA	UGL	C1	10-Apr-87	0.566	0.283	10	1.02
CU	SC02	METALS/WATER/AA	WA	UGL	C1	10-Apr-87	2.16	1.08	25	.840
FE	SC02	METALS/WATER/AA	WA	UGL	C1	10-Apr-87	16.7	8.35	200	1.05
MG	SC02	METALS/WATER/AA	WA	UGL	C1	10-Apr-87	82.8	41.4	2000	.949
CO	SC06	METALS/WATER/AA	WA	UGL	C1	23-Jan-89	78.7	39.35	2500	1.02
CR	SC06	METALS/WATER/AA	WA	UGL	C1	23-Jan-89	46.8	23.4	250	1.07
CU	SC06	METALS/WATER/AA	WA	UGL	C1	23-Jan-89	10.6	5.3	100	1.04
FE	SC06	METALS/WATER/AA	WA	UGL	C1	23-Jan-89	78.7	39.35	250	1.06
MG	SC06	METALS/WATER/AA	WA	UGL	C1	23-Jan-89	38.8	19.4	250	1.12
AS	SD05	METALS/WATER/GFAA	WA	UGL	C1	02-Jun-87	5.26	2.63	49.4	1.04
PB	SD16	METALS/WATER/GFAA	WA	UGL	C1	15-Jul-88	4.74	2.37	40	.875
AG	SD24	METALS/WATER/GFAA	WA	UGL	C1	30-Jan-89	0.316	0.158	4	1.05
AS	SD24	METALS/WATER/GFAA	WA	UGL	C1	30-Jan-89	3.09	1.545	20	1.12
MG	SD24	METALS/WATER/GFAA	WA	UGL	C1	30-Jan-89	26.8	13.4	100	.789
PB	SD24	METALS/WATER/GFAA	WA	UGL	C1	30-Jan-89	4.74	2.37	40	.875
SE	SD24	METALS/WATER/GFAA	WA	UGL	C1	30-Jan-89	4.1	2.05	20	1.07
V	SD24	METALS/WATER/GFAA	WA	UGL	C1	30-Jan-89	14.6	7.3	80	1.19
AS	SE03	METALS/WATER/AAHYDRIDE	WA	UGL	C1	20-Jan-89	6.55	3.275	20	1.13
SE	SE03	METALS/WATER/AAHYDRIDE	WA	UGL	C1	20-Jan-89	6.58	3.29	40	.978

Analyte	USATHAMA Method	Analysis	Matrix	Units	Cert. Level	Date Certified	Certified Reporting Limit	Criterion of Detection	Maximum Conc.	Method Accuracy
AG	SS11	METALS/WATER/ICP SEQ	WA	UGL	C1	12-Dec-88	36.8	18.4	500	.947
AL	SS11	METALS/WATER/ICP SEQ	WA	UGL	C1	12-Dec-88	183	91.5	900	1.11
B	SS11	METALS/WATER/ICP SEQ	WA	UGL	C1	12-Dec-88	264	132	10000	.989
BA	SS11	METALS/WATER/ICP SEQ	WA	UGL	C1	12-Dec-88	1.35	0.675	400	.941
BE	SS11	METALS/WATER/ICP SEQ	WA	UGL	C1	12-Dec-88	1.61	0.805	250	.979
BI	SS11	METALS/WATER/ICP SEQ	WA	UGL	C1	12-Dec-88	84.5	42.25	2500	.988
CA	SS11	METALS/WATER/ICP SEQ	WA	UGL	C1	12-Dec-88	77.6	38.8	2000	.925
CD	SS11	METALS/WATER/ICP SEQ	WA	UGL	C1	12-Dec-88	2.96	1.48	1250	.989
CO	SS11	METALS/WATER/ICP SEQ	WA	UGL	C1	12-Dec-88	47.6	23.8	10000	.924
CR	SS11	METALS/WATER/ICP SEQ	WA	UGL	C1	12-Dec-88	48.7	24.35	500	.975
CU	SS11	METALS/WATER/ICP SEQ	WA	UGL	C1	12-Dec-88	21.2	10.6	1000	.966
FE	SS11	METALS/WATER/ICP SEQ	WA	UGL	C1	12-Dec-88	24.3	12.15	500	.933
K	SS11	METALS/WATER/ICP SEQ	WA	UGL	C1	12-Dec-88	346	173	5000	.795
MG	SS11	METALS/WATER/ICP SEQ	WA	UGL	C1	12-Dec-88	85.9	42.95	5000	.972
MN	SS11	METALS/WATER/ICP SEQ	WA	UGL	C1	12-Dec-88	1.03	0.515	1000	.982
MO	SS11	METALS/WATER/ICP SEQ	WA	UGL	C1	12-Dec-88	10.7	5.35	800	1.04
NA	SS11	METALS/WATER/ICP SEQ	WA	UGL	C1	12-Dec-88	488	244	5800	.960
NI	SS11	METALS/WATER/ICP SEQ	WA	UGL	C1	12-Dec-88	30.1	15.05	300	.933
SB	SS11	METALS/WATER/ICP SEQ	WA	UGL	C1	12-Dec-88	66.5	33.25	6000	.926
SE	SS11	METALS/WATER/ICP SEQ	WA	UGL	C1	12-Dec-88	128	64	7500	.993
TE	SS11	METALS/WATER/ICP SEQ	WA	UGL	C1	12-Dec-88	104	52	2000	.987
TL	SS11	METALS/WATER/ICP SEQ	WA	UGL	C1	12-Dec-88	45.3	22.65	8000	1.02
V	SS11	METALS/WATER/ICP SEQ	WA	UGL	C1	12-Dec-88	50	25	800	1.01
ZN	SS11	METALS/WATER/ICP SEQ	WA	UGL	C1	12-Dec-88	43.7	21.85	1000	1.03
AG	SS16	METALS/WATER/ICP SIM	WA	UGL	C1	05-Apr-91	32	16	500	.935
AL	SS16	METALS/WATER/ICP SIM	WA	UGL	C1	05-Apr-91	81.5	40.7	2250	.944
AS	SS16	METALS/WATER/ICP SIM	WA	UGL	C1	05-Apr-91	43.8	21.9	600	.963
B	SS16	METALS/WATER/ICP SIM	WA	UGL	C1	05-Apr-91	125	62.5	2500	.982
BA	SS16	METALS/WATER/ICP SIM	WA	UGL	C1	05-Apr-91	1.52	0.76	40	1.02

Analyte	USATHAMA Method	Analysis	Matrix	Units	Cert Level	Date Certified	Certified Reporting Limit	Criterion of Detection	Maximum Conc.	Method Accuracy
BE	SS16	METALS/WATER/ICP SIM	WA	UGL	C1	03-May-91	0.341	0.171	10	.983
CA	SS16	METALS/WATER/ICP SIM	WA	UGL	C1	05-Apr-91	36.6	18.3	1000	.949
CD	SS16	METALS/WATER/ICP SIM	WA	UGL	C1	05-Apr-91	2.67	1.335	50	.972
CO	SS16	METALS/WATER/ICP SIM	WA	UGL	C1	05-Apr-91	25	12.5	500	.968
CR	SS16	METALS/WATER/ICP SIM	WA	UGL	C1	05-Apr-91	4.47	2.235	100	.978
CU	SS16	METALS/WATER/ICP SIM	WA	UGL	C1	05-Apr-91	4.29	2.145	100	.947
FE	SS16	METALS/WATER/ICP SIM	WA	UGL	C1	05-Apr-91	24.6	12.3	500	.982
MG	SS16	METALS/WATER/ICP SIM	WA	UGL	C1	05-Apr-91	38.1	19	500	.931
MN	SS16	METALS/WATER/ICP SIM	WA	UGL	C1	05-Apr-91	6.88	3.44	200	.980
MO	SS16	METALS/WATER/ICP SIM	WA	UGL	C1	05-Apr-91	14.9	7.45	400	.975
NI	SS16	METALS/WATER/ICP SIM	WA	UGL	C1	05-Apr-91	8.76	4.38	150	.944
PB	SS16	METALS/WATER/ICP SIM	WA	UGL	C1	05-Apr-91	40.6	20.3	1000	.945
SB	SS16	METALS/WATER/ICP SIM	WA	UGL	C1	05-Apr-91	51.2	25.6	1000	.967
SE	SS16	METALS/WATER/ICP SIM	WA	UGL	C1	05-Apr-91	104	52.2	1500	.924
TE	SS16	METALS/WATER/ICP SIM	WA	UGL	C1	03-May-91	31.1	15.5	500	.926
TL	SS16	METALS/WATER/ICP SIM	WA	UGL	C1	05-Apr-91	114	56.8	2000	.920
V	SS16	METALS/WATER/ICP SIM	WA	UGL	C1	05-Apr-91	4	2	80	.975
ZN	SS16	METALS/WATER/ICP SIM	WA	UGL	C1	05-Apr-91	19.4	9.37	200	.947
FE2	SY02	IRON2/SPECTRO/WATER	WA	UGL	C1	04-Jun-90	5.29	2.645	1000	.970
CRHEX	SY03	HEXCR/WATER/SPEC	WA	UGL	C1	11-Jul-90	5	2.5	500	1.01
P4	TF09	ANIONS/WATER/TECHNICON	WA	UGL	C1	10-Mar-87	29.7	14.85	2000	1.02
NIT	TF10	ANIONS/WATER/TECHNICON	WA	UGL	C1	10-Mar-87	5.26	2.63	100	.968
P4	TF32	INORGANIC/WATER/TECHNICON	WA	UGL	C1	30-May-90	28.3	14.15	1600	1.01
CL	TT02	ANIONS/WATER/IONCHROM	WA	UGL	C1	10-Apr-87	933	466.5	11100	.964
F	TT02	ANIONS/WATER/IONCHROM	WA	UGL	C1	10-Apr-87	171	85.5	1960	.977

TABLE 1. Summary of ADL USATHAMA Program Methods

Analyte	USATHAMA Method	Analysis	Matrix	Units	Cert. Level	Date Certified	Certified Reporting Limit	Criterion of Detection	Maximum Conc.	Method Accuracy
SO4	TT02	ANIONS/WATER/IONCHROM	WA	UGL	C1	10-Apr-87	12900	6450	215000	.958
BR	TT08	ANIONS/WATER/IONCHROM	WA	UGL	C1	04-Jan-89	50	25	1000	.950
CL	TT08	ANIONS/WATER/IONCHROM	WA	UGL	C1	04-Jan-89	273	136.5	2000	.839
F	TT08	ANIONS/WATER/IONCHROM	WA	UGL	C1	04-Jan-89	71	35.5	2000	1.00
NIT	TT08	ANIONS/WATER/IONCHROM	WA	UGL	C1	04-Jan-89	27.9	13.95	200	.912
NO2	TT08	ANIONS/WATER/IONCHROM	WA	UGL	C1	04-Jan-89	28.3	14.15	1000	.998
NO3	TT08	ANIONS/WATER/IONCHROM	WA	UGL	C1	04-Jan-89	24.3	12.15	200	.906
PO4	TT08	ANIONS/WATER/IONCHROM	WA	UGL	C1	04-Jan-89	33	16.5	1000	.984
SO4	TT08	ANIONS/WATER/IONCHROM	WA	UGL	C1	04-Jan-89	137	68.5	5000	.937
CYN	TY01	CYANIDE/WATER/TECHNICON	WA	UGL	C1	02-Jun-87	25.3	12.65	100	.749
CYN	TY12	CYANIDE/WATER/MANUAL	WA	UGL	C1	09-Feb-90	5	2.5	200	.965
SULFID	TY13	SULFIDE/WATER/SPECTRO	WA	UGL	C1	30-May-90	12.4	6.2	396	1.41
111TCE	UG05	HALOCARBONS/WATER/GCELCD	WA	UGL	C1	01-Jul-88	0.179	0.0895	1.98	1.09
112TCE	UG05	HALOCARBONS/WATER/GCELCD	WA	UGL	C1	01-Jul-88	0.066	0.033	1	.934
112TCE	UG05	HALOCARBONS/WATER/GCELCD	WA	UGL	C1	01-Jul-88	0.066	0.033	2	.934
11DCE	UG05	HALOCARBONS/WATER/GCELCD	WA	UGL	C1	01-Jul-88	0.17	0.085	1.98	.973
11DCLE	UG05	HALOCARBONS/WATER/GCELCD	WA	UGL	C1	01-Jul-88	0.269	0.1345	1.98	1.01
12DCLB	UG05	HALOCARBONS/WATER/GCELCD	WA	UGL	C1	01-Jul-88	0.548	0.274	3.97	1.01
12DCLE	UG05	HALOCARBONS/WATER/GCELCD	WA	UGL	C1	01-Jul-88	0.269	0.1345	2.01	1.10
12DCLP	UG05	HALOCARBONS/WATER/GCELCD	WA	UGL	C1	01-Jul-88	0.133	0.0665	1.99	1.02
13DCLB	UG05	HALOCARBONS/WATER/GCELCD	WA	UGL	C1	01-Jul-88	0.235	0.1175	4.02	.969
14DCLB	UG05	HALOCARBONS/WATER/GCELCD	WA	UGL	C1	01-Jul-88	0.394	0.197	3.97	.999
BRDCLM	UG05	HALOCARBONS/WATER/GCELCD	WA	UGL	C1	01-Jul-88	1.34	0.67	3.96	1.16
C13DCP	UG05	HALOCARBONS/WATER/GCELCD	WA	UGL	C1	01-Jul-88	1.05	0.525	4	1.11
C2H3CL	UG05	HALOCARBONS/WATER/GCELCD	WA	UGL	C1	01-Jul-88	0.46	0.23	10	1.15
C2H5CL	UG05	HALOCARBONS/WATER/GCELCD	WA	UGL	C1	01-Jul-88	0.858	0.429	9.9	.917

Analyte	USATHAMA Method	Analysis	Matrix	Units	Cert. Level	Date Certified	Certified Reporting Limit	Criterion of Detection	Maximum Conc.	Method Accuracy
CCL4	UG05	HALOCARBONS/WATER/GCELCD	WA	UGL	C1	01-Jul-88	0.151	0.0755	2.04	1.01
CH2CL2	UG05	HALOCARBONS/WATER/GCELCD	WA	UGL	C1	01-Jul-88	2.38	1.19	16.1	1.03
CH3CL	UG05	HALOCARBONS/WATER/GCELCD	WA	UGL	C1	01-Jul-88	0.733	0.3665	8	1.02
CHBR3	UG05	HALOCARBONS/WATER/GCELCD	WA	UGL	C1	01-Jul-88	0.727	0.3635	2.03	.532
CHCL3	UG05	HALOCARBONS/WATER/GCELCD	WA	UGL	C1	01-Jul-88	0.727	0.3635	2	1.20
CLC6H5	UG05	HALOCARBONS/WATER/GCELCD	WA	UGL	C1	01-Jul-88	0.999	0.4995	3.99	1.24
DBRCLM	UG05	HALOCARBONS/WATER/GCELCD	WA	UGL	C1	01-Jul-88	0.383	0.1915	2	.832
T12DCE	UG05	HALOCARBONS/WATER/GCELCD	WA	UGL	C1	01-Jul-88	0.667	0.3335	4	.999
T13DCP	UG05	HALOCARBONS/WATER/GCELCD	WA	UGL	C1	01-Jul-88	0.708	0.354	4	1.09
TCLEA	UG05	HALOCARBONS/WATER/GCELCD	WA	UGL	C1	01-Jul-88	0.563	0.2815	2.03	1.10
TCLEE	UG05	HALOCARBONS/WATER/GCELCD	WA	UGL	C1	01-Jul-88	0.03	0.015	1	1.05
TRCLE	UG05	HALOCARBONS/WATER/GCELCD	WA	UGL	C1	01-Jul-88	0.366	0.183	1.99	1.07
ALDRN	UH03	PESTICIDES/WATER/GCECD	WA	UGL	1B	10-Apr-87	0.0049	0.00245	0.049	.806
DLDRN	UH03	PESTICIDES/WATER/GCECD	WA	UGL	1B	10-Apr-87	0.043	0.0215	0.498	.926
ENDRN	UH03	PESTICIDES/WATER/GCECD	WA	UGL	1B	10-Apr-87	0.035	0.0175	0.498	1.02
ISODR	UH03	PESTICIDES/WATER/GCECD	WA	UGL	1B	10-Apr-87	0.0035	0.00175	0.049	.820
ABHC	UH16	PESTICIDES/WATER/GCECD	WA	UGL	1B	09-Jan-89	0.00561	0.002805	0.05	.541
ACLDAN	UH16	PESTICIDES/WATER/GCECD	WA	UGL	1B	09-Jan-89	0.00201	0.001005	0.05	.572
DBHC	UH16	PESTICIDES/WATER/GCECD	WA	UGL	1B	09-Jan-89	0.0369	0.01845	0.5	.730
DLDRN	UH16	PESTICIDES/WATER/GCECD	WA	UGL	1B	09-Jan-89	0.0218	0.0109	0.5	.798
ENDRN	UH16	PESTICIDES/WATER/GCECD	WA	UGL	1B	09-Jan-89	0.00764	0.00382	0.1	1.04
GCLDAN	UH16	PESTICIDES/WATER/GCECD	WA	UGL	1B	09-Jan-89	0.0309	0.01545	0.5	.495
HPCL	UH16	PESTICIDES/WATER/GCECD	WA	UGL	1B	09-Jan-89	0.00841	0.004205	0.05	.873
HPCLE	UH16	PESTICIDES/WATER/GCECD	WA	UGL	1B	09-Jan-89	0.061	0.0305	1	.461
ISODR	UH16	PESTICIDES/WATER/GCECD	WA	UGL	1B	09-Jan-89	0.134	0.067	1	.532
LIN	UH16	PESTICIDES/WATER/GCECD	WA	UGL	1B	09-Jan-89	0.033	0.0165	0.5	.451
PCB016	UH16	PESTICIDES/WATER/GCECD	WA	UGL	1B	09-Jan-89	0.0681	0.03405	5	.765
PCB260	UH16	PESTICIDES/WATER/GCECD	WA	UGL	1B	09-Jan-89	0.0754	0.0377	5	.854
PPDDD	UH16	PESTICIDES/WATER/GCECD	WA	UGL	1B	09-Jan-89	0.0201	0.01005	1	.723

Analyte	USATHAMA Method	Analysis	Matrix	Units	Cert. Level	Date Certified	Certified Reporting Limit	Criterion of Detection	Maximum Conc.	Method Accuracy
PPDDE	UH16	PESTICIDES/WATER/GCECD	WA	UGL	1B	09-Jan-89	0.088	0.044	1	.722
24DCLP	UJ04	PHENOLS/WATER/GCFID	WA	UGL	C1	09-Jan-89	1.68	0.84	6.13	.465
24DMPN	UJ04	PHENOLS/WATER/GCFID	WA	UGL	C1	09-Jan-89	1.41	0.705	4.67	.414
2CLP	UJ04	PHENOLS/WATER/GCFID	WA	UGL	C1	09-Jan-89	0.513	0.2565	4.61	.474
2NP	UJ04	PHENOLS/WATER/GCFID	WA	UGL	C1	09-Jan-89	0.703	0.3515	7.89	.372
46DN2C	UJ04	PHENOLS/WATER/GCFID	WA	UGL	C1	09-Jan-89	10.3	5.15	227	.579
4CL3C	UJ04	PHENOLS/WATER/GCFID	WA	UGL	C1	09-Jan-89	0.946	0.473	6.22	.676
4NP	UJ04	PHENOLS/WATER/GCFID	WA	UGL	C1	09-Jan-89	7.53	3.765	45.4	.377
CL3P	UJ04	PHENOLS/WATER/GCFID	WA	UGL	C1	09-Jan-89	0.763	0.3815	7.52	.789
PCP	UJ04	PHENOLS/WATER/GCFID	WA	UGL	C1	09-Jan-89	8.59	4.295	105	.663
DIMP	UK02	ORGANOPHOSPHOR/WATER/GCFP	WA	UGL	1B	10-Apr-87	4.14	2.07	24.6	1.07
DMMP	UK02	ORGANOPHOSPHOR/WATER/GCFP	WA	UGL	1B	10-Apr-87	2.48	1.24	25.2	.360
CPMSO	UL02	ORGANOPHOSPHOR/WATER/GCFP	WA	UGL	C1	30-Apr-87	12.2	6.1	80	1.12
CPMSO2	UL02	ORGANOPHOSPHOR/WATER/GCFP	WA	UGL	C1	30-Apr-87	5.33	2.665	80	.942
DITH	UL02	ORGANOPHOSPHOR/WATER/GCFP	WA	UGL	C1	30-Apr-87	2.77	1.385	20	.679
BTZ	UL03	ORGANOPHOSPHOR/WATER/GCFP	WA	UGL	C1	25-Jul-88	3.47	1.735	50.2	.796
CPMS	UL03	ORGANOPHOSPHOR/WATER/GCFP	WA	UGL	C1	25-Jul-88	4.73	2.365	50.4	.809
CPMSO	UL03	ORGANOPHOSPHOR/WATER/GCFP	WA	UGL	C1	25-Jul-88	14.3	7.15	49.9	.999
CPMSO2	UL03	ORGANOPHOSPHOR/WATER/GCFP	WA	UGL	C1	25-Jul-88	13.7	6.85	50.6	.924
DITH	UL03	ORGANOPHOSPHOR/WATER/GCFP	WA	UGL	C1	25-Jul-88	2.22	1.11	25.1	.979
OXAT	UL03	ORGANOPHOSPHOR/WATER/GCFP	WA	UGL	C1	25-Jul-88	2.14	1.07	25.1	.835
123TCB	UM16	SV ORGANICS/WATER/GCMS	WA	UGL	1A	15-Mar-88	3.6	1.8	200	.597
124TCB	UM16	SV ORGANICS/WATER/GCMS	WA	UGL	1A	15-Mar-88	2.8	1.4	200	.620
12DCLB	UM16	SV ORGANICS/WATER/GCMS	WA	UGL	1A	15-Mar-88	10	5	100	.582
13DBD4	UM16	SV ORGANICS/WATER/GCMS	WA	UGL	1A	15-Mar-88	6.4	3.2	100	.547
13DCLB	UM16	SV ORGANICS/WATER/GCMS	WA	UGL	1A	15-Mar-88	8.5	4.25	100	.537

TABLE 1. Summary of ADL USATHAMA Program Methods

Analyte	USATHAMA Method	Analysis	Matrix	Units	Cert. Level	Date Certified	Certified Reporting Limit	Criterion of Detection	Maximum Conc.	Method Accuracy
14DCLB	UM16	SV ORGANICS/WATER/GCMS	WA	UGL	1A	15-Mar-88	4.4	2.2	100	.559
24DNT	UM16	SV ORGANICS/WATER/GCMS	WA	UGL	1A	15-Mar-88	5.5	2.75	200	.929
26DNT	UM16	SV ORGANICS/WATER/GCMS	WA	UGL	1A	15-Mar-88	6.6	3.3	200	.854
2CNAP	UM16	SV ORGANICS/WATER/GCMS	WA	UGL	1A	15-Mar-88	9.6	4.8	100	.688
ABHC	UM16	SV ORGANICS/WATER/GCMS	WA	UGL	1A	15-Mar-88	6.8	3.4	100	.789
ALDRN	UM16	SV ORGANICS/WATER/GCMS	WA	UGL	1A	15-Mar-88	12	6	100	.719
ANAPNE	UM16	SV ORGANICS/WATER/GCMS	WA	UGL	1A	15-Mar-88	14	7	100	.667
ANAPYL	UM16	SV ORGANICS/WATER/GCMS	WA	UGL	1A	15-Mar-88	19	9.5	100	.607
ANTRC	UM16	SV ORGANICS/WATER/GCMS	WA	UGL	1A	15-Mar-88	20	10	100	.572
B2CLEE	UM16	SV ORGANICS/WATER/GCMS	WA	UGL	1A	15-Mar-88	8.1	4.05	100	.672
B2EHP	UM16	SV ORGANICS/WATER/GCMS	WA	UGL	1A	15-Mar-88	32	16	200	.628
BAANTR	UM16	SV ORGANICS/WATER/GCMS	WA	UGL	1A	15-Mar-88	14	7	100	.704
BAPYR	UM16	SV ORGANICS/WATER/GCMS	WA	UGL	1A	15-Mar-88	10	5	100	.690
BBFANT	UM16	SV ORGANICS/WATER/GCMS	WA	UGL	1A	15-Mar-88	23	11.5	100	.765
BBHC	UM16	SV ORGANICS/WATER/GCMS	WA	UGL	1A	15-Mar-88	4.9	2.45	100	.976
BGHIPY	UM16	SV ORGANICS/WATER/GCMS	WA	UGL	1A	15-Mar-88	7.1	3.55	100	.813
BKFANT	UM16	SV ORGANICS/WATER/GCMS	WA	UGL	1A	15-Mar-88	21	10.5	100	.536
CHRY	UM16	SV ORGANICS/WATER/GCMS	WA	UGL	1A	15-Mar-88	15	7.5	100	.639
CL6BZ	UM16	SV ORGANICS/WATER/GCMS	WA	UGL	1A	15-Mar-88	8.3	4.15	200	.693
CL6ET	UM16	SV ORGANICS/WATER/GCMS	WA	UGL	1A	15-Mar-88	5.1	2.55	200	.470
CPMS	UM16	SV ORGANICS/WATER/GCMS	WA	UGL	1A	15-Mar-88	5.9	2.95	100	.732
CPMSO	UM16	SV ORGANICS/WATER/GCMS	WA	UGL	1A	15-Mar-88	6.8	3.4	200	.863
CPMSO2	UM16	SV ORGANICS/WATER/GCMS	WA	UGL	1A	15-Mar-88	38	19	100	.733
DBAHA	UM16	SV ORGANICS/WATER/GCMS	WA	UGL	1A	15-Mar-88	7.5	3.75	100	.965
DBHC	UM16	SV ORGANICS/WATER/GCMS	WA	UGL	1A	15-Mar-88	6.4	3.2	100	.965
DEPD4	UM16	SV ORGANICS/WATER/GCMS	WA	UGL	1A	15-Mar-88	13	6.5	100	.730
DITH	UM16	SV ORGANICS/WATER/GCMS	WA	UGL	1A	15-Mar-88	7.7	3.85	100	.678
DLDRN	UM16	SV ORGANICS/WATER/GCMS	WA	UGL	1A	15-Mar-88	11	5.5	100	.745
DNOP	UM16	SV ORGANICS/WATER/GCMS	WA	UGL	1A	15-Mar-88	15	7.5	100	.653
DNOPD4	UM16	SV ORGANICS/WATER/GCMS	WA	UGL	1A	15-Mar-88	15	7.5	100	.714
ENDRN	UM16	SV ORGANICS/WATER/GCMS	WA	UGL	1A	15-Mar-88	6.6	3.3	200	1.00

Analyte	USATHAMA Method	Analysis	Matrix	Units	Cert. Level	Date Certified	Certified Reporting Limit	Criterion of Detection	Maximum Conc.	Method Accuracy
FANT	UM16	SV ORGANICS/WATER/GCMS	WA	UGL	1A	15-Mar-88	20	10	100	.647
HCBD	UM16	SV ORGANICS/WATER/GCMS	WA	UGL	1A	15-Mar-88	18	9	100	.607
HPCL	UM16	SV ORGANICS/WATER/GCMS	WA	UGL	1A	15-Mar-88	6.2	3.1	100	.804
HPCLE	UM16	SV ORGANICS/WATER/GCMS	WA	UGL	1A	15-Mar-88	7.2	3.6	200	.870
ICDPYR	UM16	SV ORGANICS/WATER/GCMS	WA	UGL	1A	15-Mar-88	7.2	3.6	100	1.04
LIN	UM16	SV ORGANICS/WATER/GCMS	WA	UGL	1A	15-Mar-88	5.8	2.9	200	.799
MLTHN	UM16	SV ORGANICS/WATER/GCMS	WA	UGL	1A	15-Mar-88	7.3	3.65	200	.805
NAP	UM16	SV ORGANICS/WATER/GCMS	WA	UGL	1A	15-Mar-88	17	8.5	100	.605
NBD5	UM16	SV ORGANICS/WATER/GCMS	WA	UGL	1A	15-Mar-88	5.6	2.8	100	.731
NDNPA	UM16	SV ORGANICS/WATER/GCMS	WA	UGL	1A	15-Mar-88	4.5	2.25	100	.726
OXAT	UM16	SV ORGANICS/WATER/GCMS	WA	UGL	1A	15-Mar-88	9.1	4.55	100	.627
PHANTR	UM16	SV ORGANICS/WATER/GCMS	WA	UGL	1A	15-Mar-88	22	11	100	.593
PPDDD	UM16	SV ORGANICS/WATER/GCMS	WA	UGL	1A	15-Mar-88	9.7	4.85	200	.690
PPDDE	UM16	SV ORGANICS/WATER/GCMS	WA	UGL	1A	15-Mar-88	9.3	4.65	200	.735
PPDDT	UM16	SV ORGANICS/WATER/GCMS	WA	UGL	1A	15-Mar-88	7.3	3.65	200	.754
PRTHN	UM16	SV ORGANICS/WATER/GCMS	WA	UGL	1A	15-Mar-88	4.7	2.35	200	.999
PYR	UM16	SV ORGANICS/WATER/GCMS	WA	UGL	1A	15-Mar-88	17	8.5	100	.636
111TCE	UM17	VOLATILES/WATER/GCMS	WA	UGL	1A	15-Mar-88	4.1	2.05	200	.911
112TCE	UM17	VOLATILES/WATER/GCMS	WA	UGL	1A	15-Mar-88	17	8.5	200	.913
11DCE	UM17	VOLATILES/WATER/GCMS	WA	UGL	1A	15-Mar-88	18	9	200	1.12
11DCLE	UM17	VOLATILES/WATER/GCMS	WA	UGL	1A	15-Mar-88	1.1	0.55	200	1.00
12DCD4	UM17	VOLATILES/WATER/GCMS	WA	UGL	1A	15-Mar-88	7.2	3.6	200	1.10
12DCE	UM17	VOLATILES/WATER/GCMS	WA	UGL	1A	15-Mar-88	1.1	0.55	200	1.01
12DCLB	UM17	VOLATILES/WATER/GCMS	WA	UGL	1A	15-Mar-88	9.7	4.85	200	.922
12DCLE	UM17	VOLATILES/WATER/GCMS	WA	UGL	1A	15-Mar-88	7.6	3.8	200	1.10
12DCLP	UM17	VOLATILES/WATER/GCMS	WA	UGL	1A	15-Mar-88	2.8	1.4	200	1.00
13DCLB	UM17	VOLATILES/WATER/GCMS	WA	UGL	1A	15-Mar-88	9.2	4.6	200	.942
13DCP	UM17	VOLATILES/WATER/GCMS	WA	UGL	1A	15-Mar-88	3.8	1.9	200	.989
14DCLB	UM17	VOLATILES/WATER/GCMS	WA	UGL	1A	15-Mar-88	8.1	4.05	200	.889
2CLEVE	UM17	VOLATILES/WATER/GCMS	WA	UGL	1A	15-Mar-88	82	41	200	.933

TABLE 1. Summary of ADL USATHAMA Program Methods

16-May-91

Analyte	USATHAMA Method	Analysis	Matrix	Units	Cert. Level	Date Certified	Certified Reporting Limit	Criterion of Detection	Maximum Conc.	Method Accuracy
BRDCLM	UM17	VOLATILES/WATER/GCMS	WA	UGL	1A	15-Mar-88	7.9	3.95	200	1.05
C2H3CL	UM17	VOLATILES/WATER/GCMS	WA	UGL	1A	15-Mar-88	2.9	1.45	200	1.21
C2H5CL	UM17	VOLATILES/WATER/GCMS	WA	UGL	1A	15-Mar-88	5	2.5	200	1.26
C6H6	UM17	VOLATILES/WATER/GCMS	WA	UGL	1A	15-Mar-88	2.4	1.2	200	1.02
CCL4	UM17	VOLATILES/WATER/GCMS	WA	UGL	1A	15-Mar-88	5.6	2.8	200	.947
CD2CL2	UM17	VOLATILES/WATER/GCMS	WA	UGL	1A	15-Mar-88	12	6	200	1.02
CH2CL2	UM17	VOLATILES/WATER/GCMS	WA	UGL	1A	15-Mar-88	5.4	2.7	200	1.02
CH3CL	UM17	VOLATILES/WATER/GCMS	WA	UGL	1A	15-Mar-88	1.6	0.8	200	1.48
CHBR3	UM17	VOLATILES/WATER/GCMS	WA	UGL	1A	15-Mar-88	8.2	4.1	200	.846
CHCL3	UM17	VOLATILES/WATER/GCMS	WA	UGL	1A	15-Mar-88	0.83	0.415	200	.994
CLC6H5	UM17	VOLATILES/WATER/GCMS	WA	UGL	1A	15-Mar-88	1.4	0.7	200	.980
DBRCLM	UM17	VOLATILES/WATER/GCMS	WA	UGL	1A	15-Mar-88	6.5	3.25	200	.916
ETBD10	UM17	VOLATILES/WATER/GCMS	WA	UGL	1A	15-Mar-88	9	4.5	200	.972
ETC6H5	UM17	VOLATILES/WATER/GCMS	WA	UGL	1A	15-Mar-88	9.3	4.65	200	.968
MEC6D8	UM17	VOLATILES/WATER/GCMS	WA	UGL	1A	15-Mar-88	14	7	200	1.14
MEC6H5	UM17	VOLATILES/WATER/GCMS	WA	UGL	1A	15-Mar-88	8.7	4.35	200	1.08
TCLEA	UM17	VOLATILES/WATER/GCMS	WA	UGL	1A	15-Mar-88	4.7	2.35	200	.949
TCLEE	UM17	VOLATILES/WATER/GCMS	WA	UGL	1A	15-Mar-88	2.7	1.35	200	.990
TRCLE	UM17	VOLATILES/WATER/GCMS	WA	UGL	1A	15-Mar-88	7	3.5	200	1.06
ATZ	UN05	ORGANOPHOSPHOR/WATER/GCNP	WA	UGL	C1	09-Jan-89	0.713	0.3565	23.1	.861
DDVP	UN05	ORGANOPHOSPHOR/WATER/GCNP	WA	UGL	C1	09-Jan-89	0.57	0.285	25.3	.899
MLTHN	UN05	ORGANOPHOSPHOR/WATER/GCNP	WA	UGL	C1	09-Jan-89	0.773	0.3865	25.1	1.10
PRTHN	UN05	ORGANOPHOSPHOR/WATER/GCNP	WA	UGL	C1	09-Jan-89	0.775	0.3875	24.9	1.01
SUPONA	UN05	ORGANOPHOSPHOR/WATER/GCNP	WA	UGL	C1	09-Jan-89	0.952	0.476	22.6	1.06
NDNPA	UN06	ORGANOPHOSPHOR/WATER/GCNP	WA	UGL	C1	04-Jan-89	0.25	0.125	50	.755
NNDMEA	UN06	ORGANOPHOSPHOR/WATER/GCNP	WA	UGL	C1	04-Jan-89	0.224	0.112	20.1	.267
NNDPA	UN06	ORGANOPHOSPHOR/WATER/GCNP	WA	UGL	C1	04-Jan-89	0.9	0.45	100	1.10
12DCLB	UP04	AROMATICS/WATER/GCPID	WA	UGL	C1	31-Oct-88	0.167	0.0835	3.97	1.09

TABLE 1. Summary of ADL USATHAMA Program Methods

16-May-91

Analyte	USATHAMA Method	Analysis	Matrix	Units	Cert. Level	Date Certified	Certified Reporting Limit	Criterion of Detection	Maximum Conc.	Method Accuracy
13DCLB	UP04	AROMATICS/WATER/GCPID	WA	UGL	C1	31-Oct-88	0.105	0.0525	4.02	1.04
14DCLB	UP04	AROMATICS/WATER/GCPID	WA	UGL	C1	31-Oct-88	0.215	0.1075	4.08	1.04
C6H6	UP04	AROMATICS/WATER/GCPID	WA	UGL	C1	31-Oct-88	0.128	0.064	3.98	1.07
CLC6H5	UP04	AROMATICS/WATER/GCPID	WA	UGL	C1	31-Oct-88	0.102	0.051	3.98	1.05
ETC6H5	UP04	AROMATICS/WATER/GCPID	WA	UGL	C1	31-Oct-88	0.317	0.1585	7.98	1.05
MEC6H5	UP04	AROMATICS/WATER/GCPID	WA	UGL	C1	31-Oct-88	0.362	0.181	3.99	1.06
135TNB	UW20	EXPLOSIVES/WATER/HPLC	WA	UGL	C1	14-Nov-88	0.207	0.1035	20	0.93
13DNB	UW20	EXPLOSIVES/WATER/HPLC	WA	UGL	C1	14-Nov-88	0.1	0.05	20.1	.914
246TNT	UW20	EXPLOSIVES/WATER/HPLC	WA	UGL	C1	14-Nov-88	0.484	0.242	40	.943
24DNT	UW20	EXPLOSIVES/WATER/HPLC	WA	UGL	C1	14-Nov-88	0.588	0.294	39	1.15
26DNT	UW20	EXPLOSIVES/WATER/HPLC	WA	UGL	C1	14-Nov-88	0.308	0.154	40.9	.659
HMX	UW20	EXPLOSIVES/WATER/HPLC	WA	UGL	C1	14-Nov-88	1.09	0.545	8.21	.572
NB	UW20	EXPLOSIVES/WATER/HPLC	WA	UGL	C1	14-Nov-88	0.407	0.2035	81.3	.926
RDX	UW20	EXPLOSIVES/WATER/HPLC	WA	UGL	C1	14-Nov-88	0.343	0.1715	8.61	.836
TETRYL	UW20	EXPLOSIVES/WATER/HPLC	WA	UGL	C1	14-Nov-88	0.49	0.245	40.1	.821
135TNB	UW26	EXPLOSIVES/WATER/HPLC	WA	UGL	C1	08-Jan-90	0.388	0.194	24.3	.982
13DNB	UW26	EXPLOSIVES/WATER/HPLC	WA	UGL	C1	08-Jan-90	0.27	0.135	25	.955
246TNT	UW26	EXPLOSIVES/WATER/HPLC	WA	UGL	C1	08-Jan-90	0.767	0.3835	49.7	.881
24DNT	UW26	EXPLOSIVES/WATER/HPLC	WA	UGL	C1	08-Jan-90	1.16	0.58	49.3	.889
26DNT	UW26	EXPLOSIVES/WATER/HPLC	WA	UGL	C1	08-Jan-90	1.11	0.555	50.2	.893
HMX	UW26	EXPLOSIVES/WATER/HPLC	WA	UGL	C1	08-Jan-90	0.869	0.4345	49.9	.778
NB	UW26	EXPLOSIVES/WATER/HPLC	WA	UGL	C1	08-Jan-90	1.54	0.77	110	.977
RDX	UW26	EXPLOSIVES/WATER/HPLC	WA	UGL	C1	08-Jan-90	0.617	0.3085	51	.929
TETRYL	UW26	EXPLOSIVES/WATER/HPLC	WA	UGL	C1	08-Jan-90	0.191	0.0955	19.7	.912
245T	UW31	HERBICIDES/WATER/HPLC	WA	UGL	C1	11-Dec-90	1.99	0.995	19.4	.990
245TP	UW31	HERBICIDES/WATER/HPLC	WA	UGL	C1	11-Dec-90	3.06	1.53	39.3	1.02
24D	UW31	HERBICIDES/WATER/HPLC	WA	UGL	C1	11-Dec-90	1.55	0.775	18.6	0.67

TABLE 1. Summary of ADL USATHAMA Program Methods

16-May-91

Analyte	USATHAMA Method	Analysis	Matrix	Units	Cert. Level	Date Certified	Certified Reporting Limit	Criterion of Detection	Maximum Conc.	Method Accuracy
Fluoro-	99	WATER/HPLC	WA	UGL		Not Certified	*10			
acetic Acid										
IMPA	99	WATER/ION CHROM.	WA	UGL		Not Certified	*7.5			
						RMA Preccert				
						1989				
Thiodi-	99	WATER/HPLC	WA	UGL		Not Certified	*10			
glycol										
Fluoro-	99	SOIL/HPLC	SO	UGG		Not Certified	*10			
acetic Acid										
IMPA	99	SOIL/ION CHROM.	SO	UGG		Not Certified	*75			
						RMA Preccert				
						1989				
Thiodi-	99	SOIL/HPLC	SO	UGG		Not Certified	*10			
glycol										
TPH	00	TOTAL PETROLEUM HYDROCARBO	SO							
			WA							
TOC	00	TOTAL ORGANIC CARBON	SO							
			WA							

TABLE 1. Summary of ADL USATHAMA Program Methods

Analyte	USATHAMA Method	High Level QC Mantissa	High Level QC Exponent	Extended Range	Mid Level QC Mantissa	Mid Level QC Exponent	Low Level QC Mantissa	Low Level QC Exponent
HG	JB03	4.00	-1	N	0.00	0	5.00	-2
CU	JC01	2.00	1	N	0.00	0	3.50	0
FE	JC01	1.50	2	N	0.00	0	2.00	1
MG	JC01	1.50	3	N	0.00	0	4.00	2
AG	JC06	2.40	1	N	0.00	0	3.50	0
CO	JC06	2.00	2	N	0.00	0	1.70	1
CR	JC06	2.00	1	N	0.00	0	1.30	1
CU	JC06	9.00	0	N	0.00	0	2.20	0
FE	JC06	2.40	1	N	0.00	0	1.50	1
MG	JC06	4.50	1	N	0.00	0	1.00	1
AS	JD05	4.00	1	N	0.00	0	1.00	1
AS	JD13	1.00	0	N	0.00	0	4.00	-1
AS	JE04	1.60	0	N	0.00	0	0.70	0
SE	JE04	3.00	0	N	0.00	0	0.80	0
AG	JS10	0.00	0	N	0.00	0	0.00	0
AL	JS10	2.00	2	N	0.00	0	2.25	1
B	JS10	0.00	0	N	0.00	0	0.00	0
BA	JS10	8.00	1	Y	1.60	1	1.00	0
BE	JS10	0.00	0	N	0.00	0	0.00	0
BI	JS10	0.00	0	N	0.00	0	0.00	0
CA	JS10	9.00	1	N	0.00	0	2.00	1
CD	JS10	8.00	0	N	0.00	0	4.00	0
CO	JS10	8.00	2	Y	1.60	2	5.00	0
CR	JS10	5.00	1	N	0.00	0	6.00	0

TABLE 1. Summary of ADL USATHAMA Program Methods

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Analyte	USATHAMA Method	High Level QC Mantissa	High Level QC Exponent	Extended Range	Mid Level QC Mantissa	Mid Level QC Exponent	Low Level QC Mantissa	Low Level QC Exponent
CU	JS10	1.50	1	N	0.00	0	5.00	0
FE	JS10	0.00	0	N	0.00	0	0.00	0
MG	JS10	1.00	3	Y	2.00	2	2.50	1
MN	JS10	0.00	0	N	0.00	0	0.00	0
MO	JS10	0.00	0	N	0.00	0	0.00	0
NA	JS10	0.00	0	N	0.00	0	0.00	0
NI	JS10	0.00	0	N	0.00	0	0.00	0
SB	JS10	2.50	2	Y	5.00	1	1.00	1
SE	JS10	0.00	0	N	0.00	0	0.00	0
TE	JS10	0.00	0	N	0.00	0	0.00	0
TL	JS10	0.00	0	N	0.00	0	0.00	0
V	JS10	0.00	0	N	0.00	0	0.00	0
ZN	JS10	3.00	1	N	0.00	0	8.00	0
AL	JS15	3.00	2	N	0.00	0	3.00	1
AS	JS15	2.50	2	N	0.00	0	5.00	1
B	JS15	7.50	1	N	0.00	0	1.50	1
BA	JS15	8.00	0	N	0.00	0	4.00	0
BE	JS15	2.00	0	N	0.00	0	1.50	-1
CA	JS15	8.00	1	N	0.00	0	2.50	1
CD	JS15	1.00	1	N	0.00	0	1.00	0
CO	JS15	4.00	1	N	0.00	0	4.00	0
CR	JS15	4.00	1	N	0.00	0	8.00	0
CU	JS15	1.60	1	N	0.00	0	4.00	0
FE	JS15	4.00	1	N	0.00	0	4.00	0
MG	JS15	2.00	2	Y	1.00	2	1.00	1
MN	JS15	1.60	1	N	0.00	0	2.00	0
MO	JS15	3.00	1	N	0.00	0	3.00	0
NI	JS15	2.50	1	N	0.00	0	5.00	0
SE	JS15	6.00	2	N	0.00	0	1.00	2
TE	JS15	4.00	1	N	0.00	0	1.00	1

TABLE 1. Summary of ADL USATHAMA Program Methods

Analyte	USATHAMA Method	High Level QC Mantissa	High Level QC Exponent	Extended Range	Mid Level QC Mantissa	Mid Level QC Exponent	Low Level QC Mantissa	Low Level QC Exponent
TL	JS15	3.20	2	N	0.00	0	4.00	1
V	JS15	3.00	1	N	0.00	0	3.00	0
ZN	JS15	1.80	1	N	0.00	0	1.20	1
CRHEX	JY04	4.00	2	Y	2.00	2	2.50	1
P4	KF16	5.00	1	N	0.00	0	2.00	0
CL	KT02	3.50	1	N	0.00	0	8.00	0
F	KT02	1.80	1	N	0.00	0	7.00	0
SO4	KT02	7.50	1	N	0.00	0	1.80	1
BR	KT04	8.00	1	N	0.00	0	2.00	1
CL	KT04	1.50	2	N	0.00	0	8.00	1
F	KT04	1.50	2	N	0.00	0	4.00	1
NO2	KT04	8.00	1	N	0.00	0	7.00	0
NO3	KT04	1.50	1	N	0.00	0	7.00	0
SO4	KT04	4.00	2	N	0.00	0	3.00	1
CYN	KY02	7.50	1	N	0.00	0	1.50	1
CYN	KY07	8.00	1	N	0.00	0	1.00	1
111TCE	LG05	1.50	-1	N	0.00	0	2.00	-2
112TCE	LG05	1.50	-1	N	0.00	0	2.00	-2
11DCE	LG05	1.50	-1	N	0.00	0	2.00	-2
11DCLE	LG05	1.50	-1	N	0.00	0	2.00	-2
12DCE	LG05	2.50	-1	N	0.00	0	2.00	-2
12DCLB	LG05	2.50	-1	N	0.00	0	5.00	-2
12DCLE	LG05	1.50	-1	N	0.00	0	2.00	-2
12DCLP	LG05	2.00	-1	N	0.00	0	2.00	-2

TABLE 1. Summary of ADL USATHAMA Program Methods

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Analyte	USATHAMA Method	High Level QC Mantissa	High Level QC Exponent	Extended Range	Mid Level QC Mantissa	Mid Level QC Exponent	Low Level QC Mantissa	Low Level QC Exponent
13DCLB	LG05	2.50	-1	N	0.00	0	5.00	-2
14DCLB	LG05	2.50	-1	N	0.00	0	5.00	-2
BDRCLM	LG05	0.00	0	N	0.00	0	0.00	0
C13DCP	LG05	2.00	-1	N	0.00	0	2.00	-2
C2H3CL	LG05	7.50	-1	N	0.00	0	1.00	-1
C2H5CL	LG05	7.50	-1	N	0.00	0	1.00	-1
CCL4	LG05	1.50	-1	N	0.00	0	2.50	-2
CH2CL2	LG05	1.00	0	N	0.00	0	2.50	-1
CH3CL	LG05	7.50	-1	N	0.00	0	5.00	-2
CHBR3	LG05	7.00	-1	N	0.00	0	1.50	-1
CHCL3	LG05	1.50	-1	N	0.00	0	3.00	-2
CLC6H5	LG05	2.50	-1	N	0.00	0	5.00	-2
DBRCLM	LG05	2.50	-1	N	0.00	0	5.00	-2
T13DCP	LG05	2.50	-1	N	0.00	0	2.50	-2
TCLEA	LG05	1.50	-1	N	0.00	0	1.50	-2
TCLEE	LG05	7.50	-2	N	0.00	0	1.50	-2
TRCLE	LG05	1.50	-1	N	0.00	0	5.00	-2
ALDRN	LH03	8.50	-1	N	0.00	0	0.00	0
DLDRN	LH03	8.40	0	N	0.00	0	0.00	0
ENDRN	LH03	8.40	0	N	0.00	0	0.00	0
ISODR	LH03	8.40	-1	N	0.00	0	0.00	0
ABHC	LH13	2.00	-2	N	0.00	0	1.00	-2
ACLDAN	LH13	4.00	-2	N	0.00	0	3.00	-3
ALDRN	LH13	7.50	-2	N	0.00	0	2.00	-2
DBHC	LH13	7.50	-2	N	0.00	0	1.00	-2
DLDRN	LH13	4.00	-2	N	0.00	0	1.00	-2
ENDRN	LH13	7.50	-2	N	0.00	0	1.00	-2
GCLDAN	LH13	4.00	-2	N	0.00	0	5.00	-3
HPCL	LH13	7.50	-3	N	0.00	0	2.00	0

TABLE 1. Summary of ADL USATHAMA Program Methods

Analyte	USATHAMA Method	High Level QC Mantissa	High Level QC Exponent	Extended Range	Mid Level QC Mantissa	Mid Level QC Exponent	Low Level QC Mantissa	Low Level QC Exponent
HPCLE	LH13	7.50	-2	N	0.00	0	6.00	-3
ISODR	LH13	7.50	-2	N	0.00	0	6.00	-3
LIN	LH13	2.00	-2	N	0.00	0	7.00	-3
PCB016	LH13	4.00	-1	N	0.00	0	1.00	-1
PCB260	LH13	4.00	-1	N	0.00	0	1.00	-1
PPDDD	LH13	7.50	-2	N	0.00	0	2.00	-2
PPDDE	LH13	7.50	-2	N	0.00	0	2.00	-2
24DCLP	LJ04	6.00	-1	N	0.00	0	1.00	-1
24DMPN	LJ04	0.00	0	N	0.00	0	0.00	0
2CLP	LJ04	4.00	-1	N	0.00	0	6.00	-2
2NP	LJ04	7.00	-1	N	0.00	0	4.00	-1
46DN2C	LJ04	2.00	1	N	0.00	0	7.00	0
4CL3C	LJ04	6.00	-1	N	0.00	0	8.00	-2
4NP	LJ04	4.00	0	N	0.00	0	1.00	0
CL3P	LJ04	7.00	-1	N	0.00	0	7.00	-2
PCP	LJ04	1.00	1	N	0.00	0	3.00	0
PHENOL	LJ04	1.50	-1	N	0.00	0	2.50	-2
DIMP	LK01	8.00	0	N	0.00	0	3.00	0
DMMP	LK01	8.00	0	N	0.00	0	3.00	0
CPMSO	LL01	7.50	1	N	0.00	0	5.00	1
CPMSO2	LL01	7.50	1	N	0.00	0	1.50	1
DITH	LL01	1.50	1	N	0.00	0	5.00	0
BTZ	LL02	0.00	0	N	0.00	0	0.00	0
CPMS	LL02	2.00	1	N	0.00	0	8.00	0
CPMSO	LL02	0.00	0	N	0.00	0	0.00	0
CPMSO2	LL02	2.00	1	N	0.00	0	8.00	0
DITH	LL02	0.00	0	N	0.00	0	0.00	0

TABLE 1. Summary of ADL USATHAMA Program Methods

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Analyte	USATHAMA Method	High Level QC Mantissa	High Level QC Exponent	Extended Range	Mid Level QC Mantissa	Mid Level QC Exponent	Low Level QC Mantissa	Low Level QC Exponent
OXAT	LL02	2.00	1	N	0.00	0	4.00	0
TDGCL	LL02	2.00	1	N	0.00	0	8.00	0
123TCB	LM15	0.00	0	N	0.00	0	0.00	0
124TCB	LM15	0.00	0	N	0.00	0	0.00	0
12DCLB	LM15	0.00	0	N	0.00	0	0.00	0
13DBD4	LM15	1.00	0	N	0.00	0	0.00	0
13DCLB	LM15	0.00	0	N	0.00	0	0.00	0
14DCLB	LM15	0.00	0	N	0.00	0	0.00	0
24DNT	LM15	0.00	0	N	0.00	0	0.00	0
26DNT	LM15	0.00	0	N	0.00	0	0.00	0
2CNAP	LM15	0.00	0	N	0.00	0	0.00	0
ABHC	LM15	0.00	0	N	0.00	0	0.00	0
ALDRN	LM15	0.00	0	N	0.00	0	0.00	0
ANAPNE	LM15	0.00	0	N	0.00	0	0.00	0
ANAPYL	LM15	0.00	0	N	0.00	0	0.00	0
ANTRC	LM15	0.00	0	N	0.00	0	0.00	0
B2CLEE	LM15	0.00	0	N	0.00	0	0.00	0
B2EHP	LM15	0.00	0	N	0.00	0	0.00	0
BAANTR	LM15	0.00	0	N	0.00	0	0.00	0
BAPYR	LM15	0.00	0	N	0.00	0	0.00	0
BBFANT	LM15	0.00	0	N	0.00	0	0.00	0
BBHC	LM15	0.00	0	N	0.00	0	0.00	0
BGHIPY	LM15	0.00	0	N	0.00	0	0.00	0
BKFANT	LM15	0.00	0	N	0.00	0	0.00	0
CHRY	LM15	0.00	0	N	0.00	0	0.00	0
CL6BZ	LM15	0.00	0	N	0.00	0	0.00	0
CL6ET	LM15	0.00	0	N	0.00	0	0.00	0
CPMS	LM15	0.00	0	N	0.00	0	0.00	0
CPMSO	LM15	0.00	0	N	0.00	0	0.00	0
CPMSO2	LM15	0.00	0	N	0.00	0	0.00	0

TABLE 1. Summary of ADL USATHAMA Program Methods

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Analyte	USATHAMA Method	High Level QC Mantissa	High Level QC Exponent	Extended Range	Mid Level QC Mantissa	Mid Level QC Exponent	Low Level QC Mantissa	Low Level QC Exponent
DBAHA	LM15	0.00	0	N	0.00	0	0.00	0
DBHC	LM15	0.00	0	N	0.00	0	0.00	0
DEPD4	LM15	1.00	0	N	0.00	0	0.00	0
DITH	LM15	0.00	0	N	0.00	0	0.00	0
DLDRN	LM15	0.00	0	N	0.00	0	0.00	0
DNOP	LM15	0.00	0	N	0.00	0	0.00	0
DNOPD4	LM15	1.00	0	N	0.00	0	0.00	0
ENDRN	LM15	0.00	0	N	0.00	0	0.00	0
FANT	LM15	0.00	0	N	0.00	0	0.00	0
HCBD	LM15	0.00	0	N	0.00	0	0.00	0
HPCL	LM15	0.00	0	N	0.00	0	0.00	0
HPCLE	LM15	0.00	0	N	0.00	0	0.00	0
ICDPYR	LM15	0.00	0	N	0.00	0	0.00	0
LIN	LM15	0.00	0	N	0.00	0	0.00	0
MLTHN	LM15	0.00	0	N	0.00	0	0.00	0
NAP	LM15	0.00	0	N	0.00	0	0.00	0
NBD5	LM15	1.00	0	N	0.00	0	0.00	0
NDNPA	LM15	0.00	0	N	0.00	0	0.00	0
OXAT	LM15	0.00	0	N	0.00	0	0.00	0
PHANTR	LM15	0.00	0	N	0.00	0	0.00	0
PPDDD	LM15	0.00	0	N	0.00	0	0.00	0
PPDDE	LM15	0.00	0	N	0.00	0	0.00	0
PPDDT	LM15	0.00	0	N	0.00	0	0.00	0
PRTHN	LM15	0.00	0	N	0.00	0	0.00	0
PYR	LM15	0.00	0	N	0.00	0	0.00	0
111TCE	LM16	0.00	0	N	0.00	0	0.00	0
112TCE	LM16	0.00	0	N	0.00	0	0.00	0
11DCE	LM16	0.00	0	N	0.00	0	0.00	0
11DCLE	LM16	0.00	0	N	0.00	0	0.00	0
12DCD4	LM16	1.00	-1	N	0.00	0	0.00	0

TABLE 1. Summary of ADL USATHAMA Program Methods

Analyte	USATHAMA Method	High Level QC Mantissa	High Level QC Exponent	Extended Range	Mid Level QC Mantissa	Mid Level QC Exponent	Low Level QC Mantissa	Low Level QC Exponent
12DCE	LM16	0.00	0	N	0.00	0	0.00	0
12DCLB	LM16	0.00	0	N	0.00	0	0.00	0
12DCLE	LM16	0.00	0	N	0.00	0	0.00	0
12DCLP	LM16	0.00	0	N	0.00	0	0.00	0
13DCLB	LM16	0.00	0	N	0.00	0	0.00	0
13DCP	LM16	0.00	0	N	0.00	0	0.00	0
14DCLB	LM16	0.00	0	N	0.00	0	0.00	0
2CLEVE	LM16	0.00	0	N	0.00	0	0.00	0
BRDCLM	LM16	0.00	0	N	0.00	0	0.00	0
C2H3CL	LM16	0.00	0	N	0.00	0	0.00	0
C2H5CL	LM16	0.00	0	N	0.00	0	0.00	0
C6H6	LM16	0.00	0	N	0.00	0	0.00	0
CCL4	LM16	0.00	0	N	0.00	0	0.00	0
CD2CL2	LM16	1.00	-1	N	0.00	0	0.00	0
CH2CL2	LM16	0.00	0	N	0.00	0	0.00	0
CH3CL	LM16	0.00	0	N	0.00	0	0.00	0
CHBR3	LM16	0.00	0	N	0.00	0	0.00	0
CHCL3	LM16	0.00	0	N	0.00	0	0.00	0
CLC6H5	LM16	0.00	0	N	0.00	0	0.00	0
DBRCLM	LM16	0.00	0	N	0.00	0	0.00	0
ETBD10	LM16	1.00	-1	N	0.00	0	0.00	0
ETC6H5	LM16	0.00	0	N	0.00	0	0.00	0
MEC6D8	LM16	2.00	-2	N	0.00	0	0.00	0
MEC6H5	LM16	0.00	0	N	0.00	0	0.00	0
TCLEA	LM16	0.00	0	N	0.00	0	0.00	0
TCLEE	LM16	0.00	0	N	0.00	0	0.00	0
TRCLE	LM16	0.00	0	N	0.00	0	0.00	0
ATZ	LN03	1.80	1	N	0.00	0	1.00	0
DDVP	LN03	9.00	0	N	0.00	0	1.00	0
MLTHN	LN03	9.00	0	N	0.00	0	1.00	0

TABLE 1. Summary of ADL USATHAMA Program Methods

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Analyte	USATHAMA Method	High Level QC Mantissa	High Level QC Exponent	Extended Range	Mid Level QC Mantissa	Mid Level QC Exponent	Low Level QC Mantissa	Low Level QC Exponent
PRTHN	LN03	9.00	0	N	0.00	0	1.00	0
SUPONA	LN03	1.80	1	N	0.00	0	1.00	0
NDNPA	LN06	4.62	0	N	0.00	0	2.72	-1
NNDMEA	LN06	1.93	0	N	0.00	0	1.14	-1
NNDPA	LN06	6.70	0	N	0.00	0	3.94	-1
12DCLB	LP03	3.00	-1	N	0.00	0	5.00	-2
13DCLB	LP03	3.00	-1	N	0.00	0	5.00	-2
14DCLB	LP03	3.00	-1	N	0.00	0	5.00	-2
C6H6	LP03	3.00	-1	N	0.00	0	5.00	-2
CLC6H5	LP03	3.00	-1	N	0.00	0	5.00	-2
ETC6H5	LP03	3.00	-1	N	0.00	0	5.00	-2
MEC6H5	LP03	3.00	-1	N	0.00	0	5.00	-2
MXYLEN	LP03	4.00	-1	Y	2.00	-2	4.00	-3
OXYLEN	LP03	4.00	-1	Y	7.00	-2	1.40	-2
OXYLEN	LP03	4.00	-1	Y	7.00	-2	1.40	-2
135TNB	LW16	4.00	0	N	0.00	0	1.80	0
13DNB	LW16	1.00	1	Y	2.00	0	3.00	-1
246TNT	LW16	2.00	1	Y	4.00	0	8.00	-1
135TNB	LW26	4.10	0	N	0.00	0	7.00	-1
13DNB	LW26	4.20	0	N	0.00	0	6.00	-1
246TNT	LW26	8.00	0	N	0.00	0	1.80	0
24DNT	LW26	8.00	0	N	0.00	0	1.50	0
26DNT	LW26	8.00	0	N	0.00	0	1.60	0
2NT	LW26	2.40	1	N	0.00	1	3.00	0
HMX	LW26	8.00	0	N	0.00	0	1.50	0
NB	LW26	1.66	1	N	0.00	0	2.10	0
RDX	LW26	8.00	0	N	0.00	0	9.00	-1

TABLE 1. Summary of ADL USATHAMA Program Methods

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Analyte	USATHAMA Method	High Level QC Mantissa	High Level QC Exponent	Extended Range	Mid Level QC Mantissa	Mid Level QC Exponent	Low Level QC Mantissa	Low Level QC Exponent
TETRYL	LW26	8.00	0	N	0.00	0	2.10	0
245T	LW29	1.17	1	N	0.00	0	1.80	0
245TP	LW29	1.15	1	N	0.00	0	1.00	0
24D	LW29	2.31	1	N	0.00	0	2.00	0
HG	SB03	8.00	0	N	0.00	0	2.00	0
CU	SC02	1.50	1	N	0.00	0	4.00	0
FE	SC02	1.20	2	N	0.00	0	3.00	1
MG	SC02	6.50	2	N	0.00	0	1.50	2
CO	SC06	2.00	3	N	0.00	0	1.50	2
CR	SC06	2.00	2	N	0.00	0	9.50	1
CU	SC06	9.00	1	N	0.00	0	2.00	1
FE	SC06	2.00	2	N	0.00	0	1.50	2
MG	SC06	2.00	2	N	0.00	0	7.50	1
AS	SD05	4.00	1	N	0.00	0	1.00	1
PB	SD16	3.20	1	N	0.00	0	9.00	0
AG	SD24	3.00	0	N	0.00	0	7.00	-1
AS	SD24	7.50	0	N	0.00	0	2.00	0
MG	SD24	7.50	1	N	0.00	0	4.00	1
PB	SD24	3.00	1	N	0.00	0	1.00	1
SE	SD24	1.50	1	N	0.00	0	1.00	1
V	SD24	6.00	1	N	0.00	0	3.00	1
AS	SE03	1.80	1	N	0.00	0	8.00	0
SE	SE03	3.20	1	N	0.00	0	8.00	0

TABLE 1. Summary of ADL USATHAMA Program Methods

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Analyte	USATHAMA Method	High Level QC Mantissa	High Level QC Exponent	Extended Range	Mid Level QC Mantissa	Mid Level QC Exponent	Low Level QC Mantissa	Low Level QC Exponent
AG	SS11	0.00	0	N	0.00	0	0.00	0
AL	SS11	0.00	0	N	0.00	0	0.00	0
B	SS11	0.00	0	N	0.00	0	0.00	0
BA	SS11	3.00	2	Y	6.00	1	5.00	0
BE	SS11	2.00	2	Y	4.00	1	5.00	0
BI	SS11	2.00	3	N	0.00	0	1.50	2
CA	SS11	1.00	3	N	0.00	0	1.50	2
CD	SS11	1.00	3	Y	2.00	2	5.00	0
CO	SS11	5.00	3	Y	1.00	3	1.00	2
CR	SS11	4.00	2	N	0.00	0	1.00	2
CU	SS11	8.00	2	N	0.00	0	1.00	2
FE	SS11	4.00	2	N	0.00	0	1.00	2
K	SS11	4.00	3	N	0.00	0	1.00	3
MG	SS11	4.00	3	Y	8.00	2	1.50	2
MN	SS11	8.00	2	Y	1.60	2	5.00	0
MO	SS11	6.00	2	N	0.00	0	5.00	1
NA	SS11	4.00	3	N	0.00	0	1.00	3
NI	SS11	2.50	2	N	0.00	0	7.50	1
SB	SS11	5.00	3	Y	1.00	3	1.50	2
SE	SS11	5.00	3	Y	1.00	3	2.00	2
TE	SS11	1.00	3	N	0.00	0	2.00	2
TL	SS11	7.00	3	Y	1.40	3	1.00	2
V	SS11	7.00	2	N	0.00	0	1.00	2
ZN	SS11	7.00	2	N	0.00	0	1.00	2
AG	SS16	4.00	2	N	0.00	0	6.50	1
AL	SS16	1.80	3	Y	8.15	2	1.60	2
AS	SS16	4.80	2	N	0.00	0	9.00	1
B	SS16	2.00	3	N	0.00	0	2.50	2
BA	SS16	3.20	1	Y	1.50	1	3.00	0

TABLE 1. Summary of ADL USATHAMA Program Methods

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Analyte	USATHAMA Method	High Level QC Mantissa	High Level QC Exponent	Extended Range	Mid Level QC Mantissa	Mid Level QC Exponent	Low Level QC Mantissa	Low Level QC Exponent
BE	SS16	8.00	0	Y	3.40	0	0.70	0
CA	SS16	8.00	2	Y	3.75	2	7.00	1
CD	SS16	4.00	1	N	0.00	0	5.30	0
CO	SS16	4.00	2	Y	1.75	2	5.00	1
CR	SS16	8.00	1	Y	4.50	1	9.00	0
CU	SS16	8.00	1	Y	4.50	1	9.00	0
FE	SS16	4.00	2	N	0.00	0	5.00	1
MG	SS16	4.00	2	N	0.00	0	4.00	1
MN	SS16	1.60	2	N	0.00	0	1.40	1
MO	SS16	3.20	2	Y	1.50	2	3.00	1
NI	SS16	1.20	2	N	0.00	0	2.00	1
PB	SS16	8.00	2	Y	4.00	2	8.00	1
SB	SS16	1.20	3	Y	5.00	2	1.00	2
SE	SS16	1.20	3	N	0.00	0	2.00	2
TE	SS16	4.00	2	N	0.00	0	6.00	1
TL	SS16	1.60	3	N	0.00	0	2.30	2
V	SS16	6.40	1	N	0.00	0	8.00	0
ZN	SS16	1.60	2	N	0.00	0	4.00	1
FE2	SY02	6.00	1	Y	8.00	2	1.00	1
CRHEX	SY03	4.00	2	Y	1.00	2	1.00	1
P4	TF09	1.50	3	Y	3.00	2	5.00	1
NIT	TF10	7.50	1	N	0.00	0	1.00	1
P4	TF32	1.20	3	Y	5.00	2	6.00	1
CL	TT02	9.00	3	N	0.00	0	1.80	3
F	TT02	1.50	3	N	0.00	0	4.00	2

TABLE 1. Summary of ADL USATHAMA Program Methods

16-May-91

Analyte	USATHAMA Method	High Level QC Mantissa	High Level QC Exponent	Extended Range	Mid Level QC Mantissa	Mid Level QC Exponent	Low Level QC Mantissa	Low Level QC Exponent
SO4	TT02	1.80	5	N	0.00	0	2.50	4
BR	TT08	7.50	2	N	0.00	0	1.00	2
CL	TT08	1.50	3	N	0.00	0	5.00	2
F	TT08	1.50	3	N	0.00	0	1.50	2
NIT	TT08	1.50	2	N	0.00	0	5.00	1
NO2	TT08	7.50	2	N	0.00	0	5.00	1
NO3	TT08	1.50	2	N	0.00	0	5.00	1
PO4	TT08	7.50	2	N	0.00	0	7.50	1
SO4	TT08	4.00	3	Y	8.00	2	2.00	2
CYN	TY01	8.00	1	N	0.00	0	4.00	1
CYN	TY12	1.60	2	N			1.00	1
SULFID	TY13	3.20	2	N			2.50	1
111TCE	UG05	1.50	0	N	0.00	0	5.00	-1
112TCE	UG05	0.00	0	N	0.00	0	0.00	0
112TCE	UG05	0.00	0	N	0.00	0	0.00	0
11DCE	UG05	3.00	0	N	0.00	0	5.00	-1
11DCLE	UG05	0.00	0	N	0.00	0	0.00	0
12DCLB	UG05	0.00	0	N	0.00	0	0.00	0
12DCLE	UG05	0.00	0	N	0.00	0	0.00	0
12DCLP	UG05	0.00	0	N	0.00	0	0.00	0
13DCLB	UG05	3.00	0	N	0.00	0	5.00	-1
14DCLB	UG05	0.00	0	N	0.00	0	0.00	0
BRDCLM	UG05	0.00	0	N	0.00	0	0.00	0
C13DCP	UG05	0.00	0	N	0.00	0	0.00	0
C2H3CL	UG05	7.50	0	N	0.00	0	7.00	-1
C2H5CL	UG05	0.00	0	N	0.00	0	0.00	0

TABLE 1. Summary of ADL USATHAMA Program Methods

Analyte	USATHAMA Method	High Level QC Mantissa	High Level QC Exponent	Extended Range	Mid Level QC Mantissa	Mid Level QC Exponent	Low Level QC Mantissa	Low Level QC Exponent
CCL4	UG05	1.50	0	N	0.00	0	3.00	-1
CH2CL2	UG05	0.00	0	N	0.00	0	0.00	0
CH3CL	UG05	6.00	0	N	0.00	0	1.00	0
CHBR3	UG05	1.50	0	N	0.00	0	1.00	0
CHCL3	UG05	0.00	0	N	0.00	0	0.00	0
CLC6H5	UG05	3.00	0	N	0.00	0	1.50	0
DBRCLM	UG05	0.00	0	N	0.00	0	0.00	0
T12DCE	UG05	0.00	0	N	0.00	0	0.00	0
T13DCP	UG05	3.00	0	N	0.00	0	1.00	0
TCLEA	UG05	0.00	0	N	0.00	0	0.00	0
TCLEE	UG05	0.00	0	N	0.00	0	0.00	0
TRCLE	UG05	1.50	0	N	0.00	0	6.00	-1
ALDRN	UH03	4.20	-2	N	0.00	0	0.00	0
DLDRN	UH03	4.10	-1	N	0.00	0	0.00	0
ENDRN	UH03	4.10	-1	N	0.00	0	0.00	0
ISODR	UH03	4.10	-2	N	0.00	0	0.00	0
ABHC	UH16	4.00	-2	N	0.00	0	1.00	-2
ACLDAN	UH16	4.00	-2	N	0.00	0	5.00	-3
DBHC	UH16	4.00	-1	N	0.00	0	7.00	-2
DLDRN	UH16	4.00	-1	N	0.00	0	4.00	-2
ENDRN	UH16	8.00	-2	N	0.00	0	1.00	-2
GCLDAN	UH16	4.00	-1	N	0.00	0	5.00	-2
HPCL	UH16	4.00	-2	N	0.00	0	1.00	-2
HPCLE	UH16	8.00	-1	N	0.00	0	1.00	-1
ISODR	UH16	8.00	-1	N	0.00	0	2.00	-1
LIN	UH16	4.00	-1	N	0.00	0	6.00	-2
PCB016	UH16	4.00	0	N	0.00	0	1.00	-1
PCB260	UH16	4.00	0	N	0.00	0	1.00	-1
PPDDD	UH16	8.00	-1	N	0.00	0	4.00	-2

TABLE 1. Summary of ADL USATHAMA Program Methods

16-May-91

Analyte	USATHAMA Method	High Level QC Mantissa	High Level QC Exponent	Extended Range	Mid Level QC Mantissa	Mid Level QC Exponent	Low Level QC Mantissa	Low Level QC Exponent
PPDDE	UH16	8.00	-1	N	0.00	0	1.00	-1
24DCLP	UJ04	5.00	0	N	0.00	0	3.00	0
24DMPN	UJ04	4.00	0	N	0.00	0	2.00	0
2CLP	UJ04	4.00	0	N	0.00	0	1.00	0
2NP	UJ04	7.00	0	N	0.00	0	2.00	0
46DN2C	UJ04	2.00	2	N	0.00	0	2.00	1
4CL3C	UJ04	6.00	0	N	0.00	0	2.00	0
4NP	UJ04	4.00	1	N	0.00	0	2.00	1
CL3P	UJ04	7.00	0	N	0.00	0	2.00	0
PCP	UJ04	8.00	1	N	0.00	0	2.00	1
DIMP	UK02	1.90	1	N	0.00	0	8.00	0
DMMP	UK02	1.90	1	N	0.00	0	6.00	0
CPMSO	UL02	7.00	1	N	0.00	0	2.00	1
CPMSO2	UL02	7.00	1	N	0.00	0	2.00	1
DITH	UL02	1.50	1	N	0.00	0	5.00	0
BTZ	UL03	0.00	0	N	0.00	0	0.00	0
CPMS	UL03	2.00	1	N	0.00	0	5.00	0
CPMSO	UL03	0.00	0	N	0.00	0	0.00	0
CPMSO2	UL03	2.00	1	N	0.00	0	5.00	0
DITH	UL03	2.00	1	N	0.00	0	5.00	0
OXAT	UL03	0.00	0	N	0.00	0	0.00	0
123TCB	UM16	0.00	0	N	0.00	0	0.00	0
124TCB	UM16	0.00	0	N	0.00	0	0.00	0
12DCLB	UM16	0.00	0	N	0.00	0	0.00	0
13DBD4	UM16	1.00	0	N	0.00	0	0.00	0
13DCLB	UM16	0.00	0	N	0.00	0	0.00	0

TABLE 1. Summary of ADL USATHAMA Program Methods

Analyte	USATHAMA Method	High Level QC Mantissa	High Level QC Exponent	Extended Range	Mid Level QC Mantissa	Mid Level QC Exponent	Low Level QC Mantissa	Low Level QC Exponent
14DCLB	UM16	0.00	0	N	0.00	0	0.00	0
24DNT	UM16	0.00	0	N	0.00	0	0.00	0
26DNT	UM16	0.00	0	N	0.00	0	0.00	0
2CNAP	UM16	0.00	0	N	0.00	0	0.00	0
ABHC	UM16	0.00	0	N	0.00	0	0.00	0
ALDRN	UM16	0.00	0	N	0.00	0	0.00	0
ANAPNE	UM16	0.00	0	N	0.00	0	0.00	0
ANAPYL	UM16	0.00	0	N	0.00	0	0.00	0
ANTRC	UM16	0.00	0	N	0.00	0	0.00	0
B2CLEE	UM16	0.00	0	N	0.00	0	0.00	0
B2EHP	UM16	0.00	0	N	0.00	0	0.00	0
BAANTR	UM16	0.00	0	N	0.00	0	0.00	0
BAPYR	UM16	0.00	0	N	0.00	0	0.00	0
BBFANT	UM16	0.00	0	N	0.00	0	0.00	0
BBHC	UM16	0.00	0	N	0.00	0	0.00	0
BGHIPY	UM16	0.00	0	N	0.00	0	0.00	0
BKFANT	UM16	0.00	0	N	0.00	0	0.00	0
CHRY	UM16	0.00	0	N	0.00	0	0.00	0
CL6BZ	UM16	0.00	0	N	0.00	0	0.00	0
CL6ET	UM16	0.00	0	N	0.00	0	0.00	0
CPMS	UM16	0.00	0	N	0.00	0	0.00	0
CPMSO	UM16	0.00	0	N	0.00	0	0.00	0
CPMSO2	UM16	0.00	0	N	0.00	0	0.00	0
DBAHA	UM16	0.00	0	N	0.00	0	0.00	0
DBHC	UM16	0.00	0	N	0.00	0	0.00	0
DEPD4	UM16	1.00	0	N	0.00	0	0.00	0
DITH	UM16	0.00	0	N	0.00	0	0.00	0
DLDRN	UM16	0.00	0	N	0.00	0	0.00	0
DNOP	UM16	0.00	0	N	0.00	0	0.00	0
DNOPD4	UM16	1.00	0	N	0.00	0	0.00	0
ENDRN	UM16	0.00	0	N	0.00	0	0.00	0

TABLE 1. Summary of ADL USATHAMA Program Methods

16-May-91

Analyte	USATHAMA Method	High Level QC Mantissa	High Level QC Exponent	Extended Range	Mid Level QC Mantissa	Mid Level QC Exponent	Low Level QC Mantissa	Low Level QC Exponent
FANT	UM16	0.00	0	N	0.00	0	0.00	0
HCBD	UM16	0.00	0	N	0.00	0	0.00	0
HPCL	UM16	0.00	0	N	0.00	0	0.00	0
HPCLE	UM16	0.00	0	N	0.00	0	0.00	0
ICDPYR	UM16	0.00	0	N	0.00	0	0.00	0
LIN	UM16	0.00	0	N	0.00	0	0.00	0
MLTHN	UM16	0.00	0	N	0.00	0	0.00	0
NAP	UM16	0.00	0	N	0.00	0	0.00	0
NBD5	UM16	1.00	0	N	0.00	0	0.00	0
NDNPA	UM16	0.00	0	N	0.00	0	0.00	0
OXAT	UM16	0.00	0	N	0.00	0	0.00	0
PHANTR	UM16	0.00	0	N	0.00	0	0.00	0
PPDDD	UM16	0.00	0	N	0.00	0	0.00	0
PPDDE	UM16	0.00	0	N	0.00	0	0.00	0
PPDDT	UM16	0.00	0	N	0.00	0	0.00	0
PRTHN	UM16	0.00	0	N	0.00	0	0.00	0
PYR	UM16	0.00	0	N	0.00	0	0.00	0
111TCE	UM17	0.00	0	N	0.00	0	0.00	0
112TCE	UM17	0.00	0	N	0.00	0	0.00	0
11DCE	UM17	0.00	0	N	0.00	0	0.00	0
11DCLE	UM17	0.00	0	N	0.00	0	0.00	0
12DCD4	UM17	1.20	2	N	0.00	0	0.00	0
12DCE	UM17	0.00	0	N	0.00	0	0.00	0
12DCLB	UM17	0.00	0	N	0.00	0	0.00	0
12DCLE	UM17	0.00	0	N	0.00	0	0.00	0
12DCLP	UM17	0.00	0	N	0.00	0	0.00	0
13DCLB	UM17	0.00	0	N	0.00	0	0.00	0
13DCP	UM17	0.00	0	N	0.00	0	0.00	0
14DCLB	UM17	0.00	0	N	0.00	0	0.00	0
2CLEVE	UM17	0.00	0	N	0.00	0	0.00	0

TABLE 1. Summary of ADL USATHAMA Program Methods

Analyte	USATHAMA Method	High Level QC Mantissa	High Level QC Exponent	Extended Range	Mid Level QC Mantissa	Mid Level QC Exponent	Low Level QC Mantissa	Low Level QC Exponent
BRDCLM	UM17	0.00	0	N	0.00	0	0.00	0
C2H3CL	UM17	0.00	0	N	0.00	0	0.00	0
C2H5CL	UM17	0.00	0	N	0.00	0	0.00	0
C6H6	UM17	0.00	0	N	0.00	0	0.00	0
CCL4	UM17	0.00	0	N	0.00	0	0.00	0
CD2CL2	UM17	1.00	-1	N	0.00	0	0.00	0
CH2CL2	UM17	0.00	0	N	0.00	0	0.00	0
CH3CL	UM17	0.00	0	N	0.00	0	0.00	0
CHBR3	UM17	0.00	0	N	0.00	0	0.00	0
CHCL3	UM17	0.00	0	N	0.00	0	0.00	0
CLC6H5	UM17	0.00	0	N	0.00	0	0.00	0
DBRCLM	UM17	0.00	0	N	0.00	0	0.00	0
ETBD10	UM17	1.20	2	N	0.00	0	0.00	0
ETC6H5	UM17	0.00	0	N	0.00	0	0.00	0
MEC6D8	UM17	1.40	2	N	0.00	0	0.00	0
MEC6H5	UM17	0.00	0	N	0.00	0	0.00	0
TCLEA	UM17	0.00	0	N	0.00	0	0.00	0
TCLEE	UM17	0.00	0	N	0.00	0	0.00	0
TRCLE	UM17	0.00	0	N	0.00	0	0.00	0
ATZ	UN05	2.00	1	N	0.00	0	2.00	0
DDVP	UN05	2.00	1	N	0.00	0	2.00	0
MLTHN	UN05	2.00	1	N	0.00	0	2.00	0
PRTHN	UN05	2.00	1	N	0.00	0	2.00	0
SUPONA	UN05	2.00	1	N	0.00	0	2.00	0
NDNPA	UN06	2.50	0	N	0.00	0	5.00	-1
NNDMEA	UN06	4.00	0	N	0.00	0	8.00	-1
NNDPA	UN06	9.00	0	N	0.00	0	1.80	0
12DCLB	UP04	3.00	0	N	0.00	0	3.00	-1

TABLE 1. Summary of ADL USATHAMA Program Methods

16-May-9

Analyte	USATHAMA Method	High Level QC Mantissa	High Level QC Exponent	Extended Range	Mid Level QC Mantissa	Mid Level QC Exponent	Low Level QC Mantissa	Low Level QC Exponent
13DCLB	UP04	3.00	0	N	0.00	0	3.00	-1
14DCLB	UP04	3.00	0	N	0.00	0	3.00	-1
C6H6	UP04	3.00	0	N	0.00	0	3.00	-1
CLC6H5	UP04	3.00	0	N	0.00	0	3.00	-1
ETC6H5	UP04	6.00	0	N	0.00	0	6.00	-1
MEC6H5	UP04	3.00	0	N	0.00	0	7.00	-1
135TNB	UW20	0.00	0	N	1.60	1	4.00	-1
13DNB	UW20	1.60	1	Y	3.20	0	2.00	-1
246TNT	UW20	3.20	1	Y	6.40	0	1.00	0
24DNT	UW20	3.20	1	Y	6.40	0	1.20	0
26DNT	UW20	3.20	1	Y	6.40	0	6.00	-1
HMX	UW20	7.00	0	N	0.00	0	2.20	0
NB	UW20	5.00	0	N	0.00	0	1.00	0
RDX	UW20	7.00	0	N	0.00	0	7.00	-1
TETRYL	UW20	3.20	1	Y	6.40	0	1.00	0
135TNB	UW26	2.00	1	N	0.00	0	8.00	-1
13DNB	UW26	2.00	1	N	0.00	0	5.40	-1
246TNT	UW26	4.00	1	N	0.00	0	1.50	0
24DNT	UW26	4.00	1	N	0.00	0	2.20	0
26DNT	UW26	4.00	1	N	0.00	0	2.20	0
HMX	UW26	4.00	1	N	0.00	0	1.60	0
NB	UW26	9.00	1	N	0.00	0	3.00	0
RDX	UW26	4.00	1	N	0.00	0	1.20	0
TETRYL	UW26	1.60	1	N	0.00	0	4.00	-1
245T	UW31	1.55	1	N	0.00	0	4.00	0
245TP	UW31	3.14	1	N	0.00	0	6.10	0
24D	UW31	1.49	1	N	0.00	0	3.10	0

TABLE 1. Summary of ADL USATHAMA Program Methods

Analyte	USATHAMA Method	High Level QC Mantissa	High Level QC Exponent	Extended Range	Mid Level QC Mantissa	Mid Level QC Exponent	Low Level QC Mantissa	Low Level QC Exponent
Fluoro-	99							
acetic Acid								
IMPA	99							
Thiodi-	99							
glycol								
Fluoro-	99							
acetic Acid								
IMPA	99							
Thiodi-	99							
glycol								
TPH	00							
TOC	00							